LOWER PORTNEUF WATERSHED ANALYSIS

Westside Ranger District
Caribou-Targhee National Forest
March 2010

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LINE OFFICER CONCURRENCE

As the District Ranger of the Westside Ranger District, I have worked directly with the watershed analysis interdisciplinary team, other agencies, and the public in the preparation of this document. I have confidence that this document will guide the District in the informed management of the Lower Portneuf Watershed and will serve as a clearinghouse for the most recent data for the analysis area. In addition, the Lower Portneuf Watershed Analysis will help future Westside District Rangers understand the ecological interactions and management complexities associated with the management of this very popular watershed.

Jeffery J. Hammes
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District Ranger
Westside Ranger District
25 March 2010

INTRODUCTION

The Multiple Use Sustained Yield Act of 1960 directs the USDA Forest Service to manage the renewable surface resources of the Forests for multiple uses and to provide those resources (products and services) at a conservative rate that is sustained over time.

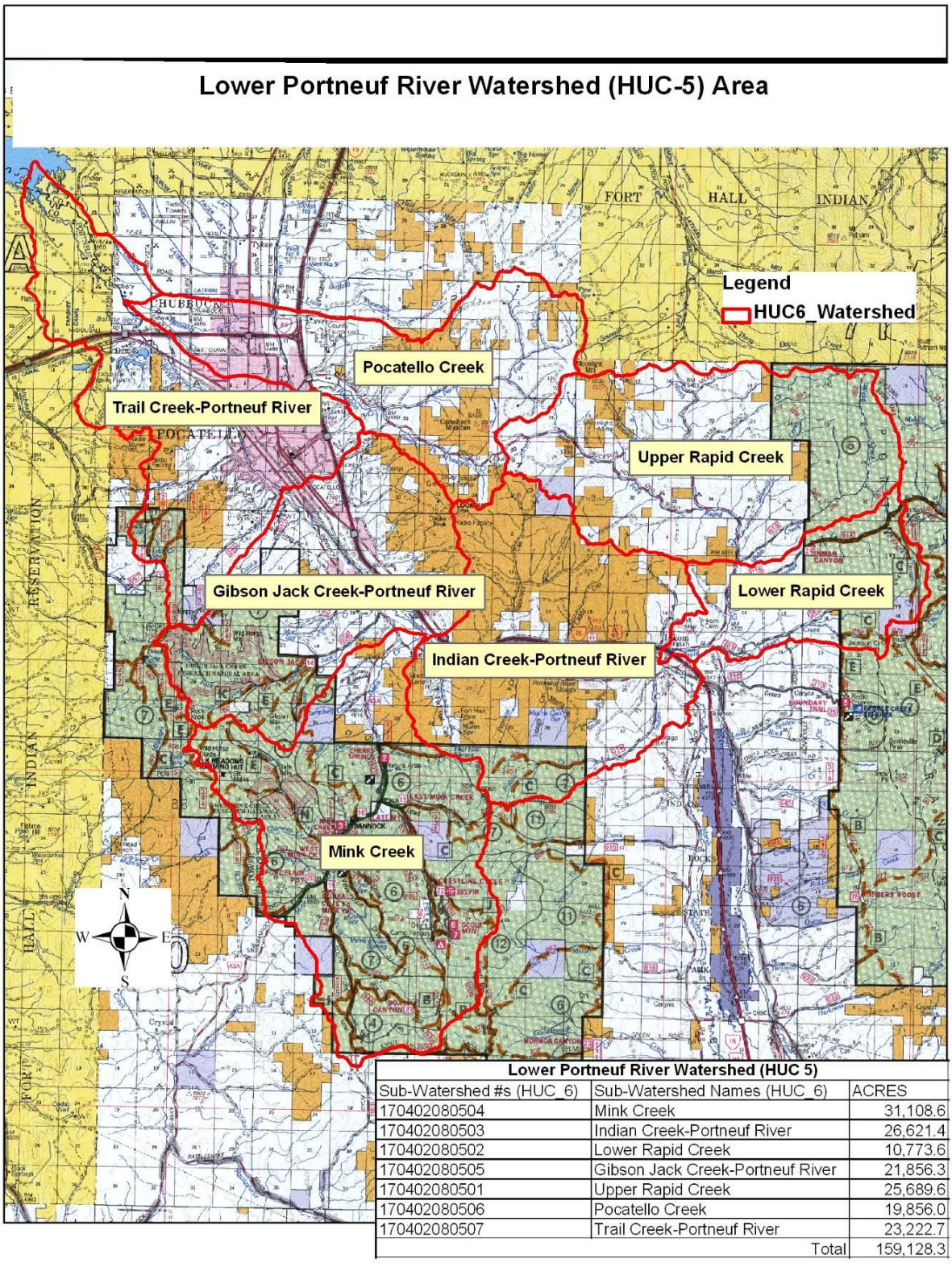
The Lower Portneuf Watershed Analysis Area features a diversity of resource uses and landownership. The competing uses of some resources in particular places within the analysis area have limited the decision space of Forest Officials. The watershed analysis process allows decision- makers and their staff an opportunity to step back and take a holistic, interdisciplinary watershed- level look at an analysis area. It is a chance to assess resource uses and ensure they occur at a sustainable level. The watershed analysis process culminates with a list of recommendations the Forest Officials can use to address resource management challenges and opportunities.

Project Area Description

The Lower Portneuf watershed analysis area includes the Trail Creek-Portneuf River, Pocatello Creek, Upper Rapid Creek, Lower Rapid Creek, Gipson Jack Creek-Portneuf River, Indian Creek-Portneuf River, and Mink Creek 6th level hydrologic unit codes (HUCs). These 6th Code HUCs compose the Lower Portneuf River 5th level HUC that drains into American Falls Reservoir. The analysis area is approximately 160,000 acres in surface area and includes approximately 72,000 acres of the Westside Ranger District, Caribou-Targhee National Forest. Approximately 45% of the analysis area is managed by

the Forest Service, 20% is managed by the Bureau of Land Management, 31% is privately owned, 3% is owned by the Shoshone-Bannock Tribes, and 1% managed by the State of Idaho.

Primary resource uses on the Forest and BLM lands include developed and dispersed camping, hiking, fishing, livestock grazing, and motorized recreation. Management activities also include prescribed burning and fire suppression. The proximity of the analysis area to Pocatello and the ease of accessibility to the drainage make it an attractive location for motorized vehicle use. Areas of conifer encroachment upon aspen stands and increased ladder fuels created by multiple layer forests have attracted the attention of fire management specialists, particularly where residential development has occurred near the Forest boundaries. The intent of this analysis is to use the most powerful tool that the Forest Service has, the interdisciplinary team, to analyze past and current conditions and trends within the analysis area to develop recommendations for the management and restoration of this area.



Lower Portneuf River Watershed (HUC 5)		
Sub-Watershed #s (HUC_6)	Sub-Watershed Names (HUC_6)	ACRES
170402080504	Mink Creek	31,108.6
170402080503	Indian Creek-Portneuf River	26,621.4
170402080502	Lower Rapid Creek	10,773.6
170402080505	Gibson Jack Creek-Portneuf River	21,856.3
170402080501	Upper Rapid Creek	25,689.6
170402080506	Pocatello Creek	19,856.0
170402080507	Trail Creek-Portneuf River	23,222.7
	Total	159,128.3

Figure 1: Watershed Analysis Area

Watershed Analysis Process

The purpose of watershed analysis is to develop and document a scientifically based understanding of the processes and interactions occurring within a watershed. This document is our current understanding of the Lower Portneuf Watershed Analysis Area.

A watershed analysis is an interdisciplinary process that compares the past and current conditions of an analysis area to develop an understanding of resource trends. The report culminates with several recommendations developed to address the identified trends. No decisions are made with this document. The findings represent a foundation on which to develop site-specific project proposals and base specific decisions.

The Lower Portneuf Watershed Analysis was conducted by a Forest Service interdisciplinary team, with data source assistance from involved citizens and agencies. There are numerous information sources pertaining to the analysis area. The interdisciplinary team used these and their personal knowledge and experiences of the analysis area to prepare the document.

The document is organized per the watershed analysis steps; Issues/Key Questions, Characterization, Past Conditions, Current Conditions, Trends, and Recommendations. Each chapter includes sections discussing soils and geology, water, vegetation (including forested vegetation, non-forested vegetation, weeds, rare plants, Research Natural Areas, and fire), range, fish, wildlife, recreation, and cultural resources.

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We thank Mike Settell, Jim Mende, Greg Mladenka for their assistance with this analysis. We thank District Ranger Jeff Hammes for providing edits and participating in the interdisciplinary team meetings.

Cover Photo: Shoshone-Bannock Winter Camp in South Pocatello Area (1884).

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ISSUES AND KEY QUESTIONS

SOILS AND GEOLOGY

Soils

A variety of soil characteristics occur within the analysis area. Understanding these characteristics and qualities for the implementation of good conservation practices will maintain soil health and help minimize impacts caused by management actions. The soil resource considerations for all management actions in the analysis area should be evaluated before soils are disturbed to ensure adequate and proper design features and mitigation measures are implemented.

1. Is the amount of ground cover that protects soils from erosion adequate to maintain stable soil conditions within the watershed? Indicator: Percent ground cover by habitat type.

2. Are riparian soils being adversely compacted/eroded from livestock grazing and dispersed camping? Indicator: Acres of riparian soils in detrimental soil condition.

3. Are management actions causing erosion on upland sites and, if so, to what extent? Have past watershed protection efforts improved soil conditions? Indicator: Acres of improvement

4. Is recreation use adversely affecting soil productivity in the watershed? Have off-road and trail restriction been effective to control soil erosion/disturbance? Have all areas that require watershed restoration been identified in the watershed and has there been a restoration plan developed for the watershed? Indicator: Acres affected by resource management.

5. What has been the effects on the soil resource from past burning from both wildfire and prescribed fire? Indicator: Acres affected by Rx fire.

6. What is the extent and amount of mining, prospecting and landslides within the watershed? Indicator: Acres affected by mining and landslides.

Geology and Minerals

From a geology and mineral resource perspective, future development potential is very low and too uncertain to add meaningful discussion at this time.

Key questions regarding geology and minerals in the watershed could include the following:

1. Is there a need for the future development of mineral material sources (for in-service uses such as road surfacing or fill material) in the watershed? Potential sources would need to be located and evaluated.
2. Is there a need to develop sites for the extraction of larger rocks for uses such as small landscaping projects at individual homes and business in the area?
3. Is there a potential for the development of a "recreational" site for the interpretation and/or collection of invertebrate (trilobite) or plant fossils?
4. Should recreational suction dredging for gold be allowed under the State's recreational "one stop" permit system, or should the streams remain closed as they presently are?

WATER

"One who asks a question is a fool for five minutes; one who does not ask a question remains a fool forever." – Chinese Proverb

The hydrology-related issues include stream channel and riparian area health, water quality, and watershed function. Specific activities and the key questions related to those activities are listed below.

1. Livestock Grazing: Is the implementation and effectiveness of livestock grazing practices adequate to protect and/or improve stream channel/riparian health and water quality? Are the RFP standards and guidelines properly implemented and if so, are stream channel and riparian conditions adequately protected or improving by those practices?
2. Transportation System: How does the transportation system impact stream channel function and aquatic organism passage? Are excessive pollutants (e.g. sediment) and runoff delivered to streams from the transportation system?
3. Unmanaged Recreation: Is unmanaged recreation impacting water quality, stream health, and/or watershed health?
4. Beaver: What role does, and did, beaver activity play in stream channel evolution throughout the area? Do beaver play an important role in maintaining healthy stream channel and riparian conditions within the analysis area? What is the current and historic extent of beaver activity? Is habitat for beaver limited in areas once occupied by beaver?
5. Stream Channel and Wetland Alteration: Have human activities seriously altered stream channel or wetland conditions? Do restoration opportunities exist?
6. Hydrologic Disturbance**:** A guideline of the Caribou RFP is that "not more than 30% of any of the principal watersheds and/or their subwatersheds should be in a hydrologically disturbed condition at any one time." What is the current level of hydrologic disturbance in this watershed?
7. Development: What is the impact of residential and commercial development occurring near the Forest? What is the current extent and impact of small reservoirs and stream diversions in the analysis area?

VEGETATION

Forested Vegetation

The "Caribou National Forest and Surrounding Area Sub-Regional Properly Functioning Condition Assessment" and other similar broad scale assessments have indicated that existing vegetation distribution, structure, and composition are outside the historic range of variability across much of the Westside Ranger District. Therefore, the vegetation within the Mink Creek watershed assessment area is likely also outside historic ranges, which has the potential to adversely affect ecosystem function.

The vegetation pattern is indicative of a dry area. Tree cover is scattered and generally tree stand size is small in acres. Wetter aspects support tree cover (north and east) while south and west aspects are sagebrush and grass. In many south and west aspects there is heavy juniper cover and in some cases not much else. Sub-alpine fir occurs in some forest under stories and, in some cases, is beginning to dominate some Douglas fir stands. The aspen stands, that tend to occur in the wetter aspects, are being encroached by conifer, both Douglas fir and sub-alpine fir.

1. What are the desired conditions as set out in the Forest Plan?

2. How has the structure of forested and non-forested cover types i.e. density, species composition, patch size etc. changed?

3. How has the disturbance regime changed from what is described in the Properly Functioning Condition assessment?

4. Are the cover types in mixed age classes?

5. Are there old growth stands as defined by the Forest Plan?

Weeds

Noxious weeds and invasive terrestrial species exist and are chemically treated within the Lower Portneuf Watershed analysis area. Despite active early detection rapid response practices, invasive species will continue to be a challenge to land managers.

1. How has the increased presence of noxious weeds and invasive species affected native vegetation?

2. Are noxious weed populations having a negative impact on grazing in the analysis area?

3. What are the effects of grazing on noxious weed populations?

4. Are undesirable invasive grass species expanding, and what are the impacts of grazing on these species?

5. What are the current management strategies for containing and preventing the expansion of noxious weeds?

6. What are the measures in place for preventing the invasion of noxious weeds that are currently not within the analysis area, such as leafy spurge?

Rare Plants

Rare plants occur in the analysis area. While some such as firechalice (*Eplobium canum* ssp. *garrettii*) are suspected, others such as big-leaved sedge (*Carex amplifolia*) has been documented. Rare plant distribution needs to be fully documented and resource use impacts assessed.

1. Did Davis collect foothill sedge (*Carex tumulicola*) in the Mink Creek drainage in 1931?
2. Is Garrett's firechalice (*Eplobium canum* ssp. *garrettii*) a rare plant of special concern within the watershed?
3. Are there impacts to rare plants or unique plant communities within the watershed? One documented rare plant community is big-leaved sedge (*Carex amplifolia*) plant community.

Research Natural Areas

Two research natural areas occur within the analysis area; Gipson Jack Creek and West Mink Creek research natural areas. The Caribou Forest Plan requires the Forest to maintain the integrity of these areas.

1. Are there conflicts with the resource protection of the RNAs and recreational activities?

2. How should we promote the use of the RNAs for research and reference while protecting the RNAs?

3. Are there non-native invasive species invading into the RNA?

Fire

Fire occurrence has been limited to small acreage due to fire suppression except with the occasional large wildland fire such as Rattlesnake Fire in 2005.

1. What are the desired conditions for fire regimes and intensities in this watershed?

2. Are the present patterns and intensities different?

3. If there are differences how are they affecting things like fuel loadings, species or communities of plants and animals, and air quality?

4. What are our treatment options to bring us back to our desired conditions?

6. What are the management options to deal with the encroachment of conifer into the aspen/shrub communities?

RANGE

Livestock grazing by cattle and sheep has occurred in the lower Portneuf analysis area since before the induction of management by the Forest Service. Since that time, livestock numbers have been drastically reduced.

1. Are disturbance regimes within the natural range of variability to provide diverse and sustainable rangeland ecosystems?

2. Is the non-forested vegetation component moving toward desired future conditions, as described in the Revised Forest Plan (2003)?

3. Are livestock numbers and the grazing strategy adequate to provide proper management of riparian and upland vegetation within the analysis area?

4. Is off-road travel and recreational camping causing damage to the resources important for grazing?

5. Is shrub canopy within the standards as listed in the Revised Forest Plan (2003)?

FISH

Yellowstone cutthroat trout, a Regional Foresters Sensitive Species, occurs in the analysis area. The Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek watersheds support many isolated populations of Yellowstone cutthroat trout. YCT populations located on tribal, public, and private lands are thriving in headwater streams reaches where sufficient habitat is present, while degradation of water quality and fish habitat are impacting main-stem fisheries. Currently, YCT populations within these watersheds are in decline due to stream habitat impacts and connectivity, competition with non-native fish, and introgression with rainbow trout. Land uses within the watershed include municipal, farming, irrigation, rangeland and grazing, mining, road and trail building and maintenance, motorized recreation, camping, hunting and fishing.

1. What land uses have caused the decline of Yellowstone cutthroat trout and what changes could decrease these effects.

2. What are the dominant sediment delivery mechanisms in the analysis area and how did they compare with natural processes? Where are the high risk areas?

3. What upstream migration barriers (natural and manmade) for fish exist in the analysis area? What actions are required to address these barriers?

4. Where are the irrigation diversions within the analysis area and to what degree do they entrain downstream-migrating fish?

5. How and to what extent has native fish in the analysis area been affected by the introduction of non-native fish? What actions are required to address these concerns?

6. What survey and monitoring should be conducted to gain a better understanding of the quality and quantity of aquatic species habitat and populations?

7. How are downstream land use practices affecting aquatic biota on the Forest and what actions can agencies and organizations take to address them and, in turn, benefit Forest aquatic biota?

WILDLIFE

Important issues impacting wildlife and their habitat within the watershed include recreation and transportation, range utilization/condition, beaver activity, fire ecology and the loss of aspen, and residential development.

Recreation/Transportation

Recreation and transportation within the watershed, including motorized travel (OHV, motorcycle, and snowmobile recreation), mountain biking, and disbursed camping are issues of concern within the watershed. A key question relating to this issue is: To what extent do these recreation activities at current and expected future levels impact wildlife, wildlife habitat and ecosystem processes that are important to wildlife?

Range Resources

Another issue within the watershed is the annual range condition, trend of that condition, and the impact from big game and cattle grazing within the area. The following is a key question relating to this issue: Are the critical landscape processes of a regular fire cycle and beaver activity and cycles able to function with the current grazing practices and management strategy and big game population levels?

Beaver Ecology

Beaver activity within the watershed is an important issue. Beaver is a keystone species in this environment, which means that their presence and activity shape the overall environment, especially the riparian systems, which are critical to most wildlife species at some stage of their life history. The three key questions related to this issue are the following: Are the necessary habitat and forage elements and key processes (aspen and willow rejuvenation) in place and functioning within the watershed? Are beaver present where expected in the watershed? Are problem beaver dealt with in an appropriate manner and are reoccurring problem locations being reviewed for beaver-friendly alternatives?

Fire Ecology and the Loss of Aspen

Fire suppression activities over the last century have significantly altered the ecological conditions, especially with regard to fire. Some of these impacts include changes to the fire return interval and fuel loading within the Forest. One of the most significant impacts to wildlife habitat is the loss of a vast amount of aspen habitat and/or a conversion from aspen to conifer. A key question with regard to the loss of aspen and fire ecology is: How can we maintain the current level of aspen we now have, and restore aspen communities within the watershed to levels closer to historic acreages?

Another issue with respect to fire ecology is the importance of fire in creating a patchy mosaic pattern within vegetation cover types resulting from smaller scale natural fires. The early successional stage of these habitats resulting from these fires in juxtaposition with a diversity of other ages of habitats is important to many species of wildlife. Habitats within this watershed where fire plays an important role include the riparian, mountain brush, grassland/steppe, aspen and conifer. Key questions with regard to this issue are the following: What areas and habitats are out of balance with regard to the fire cycle and historic natural variation? How can fire be managed within the watershed in the context of the current ecological and anthropogenic conditions to mimic the pre-historic range of variation and maximize wildlife habitat?

Residential Development

Residential and commercial development in the Intermountain West is one of the most significant threats to wildlife habitat currently and is expected to increase in the future. Some portions of the private land within this watershed, especially those on the northern side nearest Pocatello have been developed for primary homes and more development is expected. A key question with respect to this issue is: What pressure will increased development on the private lands put on wildlife populations, and how can management of public lands help mitigate these impacts for wildlife species?

Wildlife Education

What are the wildlife and ecology education opportunities available within the watershed and how can we capitalize on those at the existing public sites within the area?

Recreation Impacts Upon Wildlife

Does dispersed camping within the analysis area affect soils, water quality, and vegetation cover, and in turn wildlife and fish habitat?

1. Motorized travel off of designated routes can adversely affect soils, water quality, and native vegetation. How can land managers improve compliance with the District's Motorized Vehicle Use Map and other travel restrictions within the analysis area? (Note: this map was formerly referred to as the Travel Plan Map).

2. Many motorized and non-motorized trails receive concentrated use within the analysis area. Can trail use be redistributed to reduce crowding, improve visitor safety and satisfaction and improve resource condition?

3. Does livestock grazing diminish the recreation experience? Can managers reduce conflict between livestock activities and recreation activities?

4. Are facilities and infrastructure within the analysis area meeting the needs of visitors? Can system roads and trails be improved to reduce impacts to soil, water and vegetation?

5. How can land managers reduce impacts from travel on designated roads and trails?

6. Will prescribed fire and fuel reduction efforts affect the recreation setting and experience? Can managers mitigate effects to recreation activities?

7. Is the transportation system appropriate for the current travel needs within the analysis area?

RECREATION

The uniqueness of the Lower Portneuf Watershed Analysis area is its proximity to Pocatello. The watershed is heavily used by recreators of all types. There is a diversity of recreational use of the analysis area. This includes motorized vehicle use, fishing, hunting, and camping. The demand for recreational use of the analysis area has created challenges and opportunities for resource managers.

1. What is the effect of recreation upon the Forest ecosystem within the analysis area?

2. Do sufficient recreational opportunities exist within the analysis area?

3. How can recreational opportunities be improved within the analysis area?

4. Are there outreach opportunities in the analysis area?

5. What monitoring is important to conduct to better manage the analysis area in an informed approach?

CULTURAL RESOURCES

The Shoshone-Bannock Tribes have ancestral reserved Treaty Rights within the analysis area. The relationship of the United States Government with American Indian tribes is based on legal agreements between sovereign nations. The Fort Bridger Treaty of July 3, 1868 along with cessation agreement of 1898 reserved hunting, fishing, and gathering rights to tribal members on "all unoccupied lands of the United States so long as game is present thereon." This right applies to all public domain lands reserved for National Forest purposes. These rights are still in effect, and management actions recognize these rights. Consultation with the Shoshone-Bannock Tribal Business Council is required on land management activities and land allocations that could affect these rights.
Tribal concerns with site specific projects revolve around impacts to their tribal treaty rights. According to the Fort Bridger Treaty, cessation agreements and subsequent court cases clarifying these rights, the Shoshone-Bannock Tribes have the right to hunt, fish, gather and practice traditional uses on all unoccupied lands in the United States. Forest Service managers have a responsibility to protect those resources essential for the Tribes to exercise their treaty rights.

Notification and involvement of the Shoshone-Bannock Tribes of the Fort Hall Indian Reservation concerning Native American cultural resource matters will be carried out as specified by the Code of Federal Regulations 36 CFR 296.7, 36 CFR 800 section 101(d)(6)(B) and in accordance with Presidential Memorandum concerning government-to-government consultation signed April 29, 1994.

A documented inventory and documentation of all significant sites needs to be completed.

1. How can the Forest increase their cooperative relationship with the Shoshone-Bannock Tribes in the management of the analysis area?
2. Are there projects within the analysis area that could be cooperatively planned and implemented between the Forest and the Tribes?

CHARACTERIZATION

SOILS AND GEOLOGY

Erosion Processes/Soil Resource

"Principles of sustainable management has expanded … to recognize the broader role that soils play in regulating key ecosystem functions such as protecting watersheds through regulation of infiltration and runoff, preventing and mitigating pollution inputs, and providing physical support as a foundation material for roads and other development" (Lal *et al*. 1997). Soils influence watersheds by:

- Providing water, nutrients, and physical support for the growth of trees and other forest plants
- Allowing an exchange of carbon dioxide, oxygen, and other gasses that affect root growth and soil organisms
- Providing a substrate for organisms linked with vital ecosystem processes

What are the parent materials and landforms that play a role in the mass stability and erosion processes/potentials inherent to the soils in the Lower Portneuf/Garden Creek-Marsh Creek/Lower Bannock Creek Watersheds?

The Lower Portneuf/Garden Creek-Marsh Creek/Lower Bannock Creek watersheds are located within the Dry Domain of the Temperate Steppe Regime Mountains Division of the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest Province of the Overthrust Mountains Section of the Basin and Range Transitional Mountains Subsection, outlined in the National Hierarchical Framework for Ecological Units (USDA Forest Service 1994). Descriptions of these different levels of ecological units are found in "A Hierarchical Stratification of Ecosystems on the Caribou National Forest" (USDA-FS 1997). There are three landtype associations (LTA) nested within the Basin and Range Transitional Mountains subsection. These are identified as:

- M331Du-51 Pocatello Foothills, Toeslopes and Canyons/Sagebrush Steppe LTA
- M331Du-52 Pocatello Ridgelands, Mountainsides and Canyons/Douglas-fir Forest and Sagebrush Steppe LTA
- M331Du-53 Elk Meadows Uplands, Basins and Mountainsides/Douglas-fir and Sagebrush Steppe LTA

The National Forest portion of these watersheds is located within the Bannock Mountain Range south of Pocatello, Idaho. The Garden Creek-Marsh Creek Watershed drains into Marsh Creek and the Lower Bannock watershed drains into Bannock Creek in Arbon Valley. Figure 1 show the Subsections found in these watersheds.

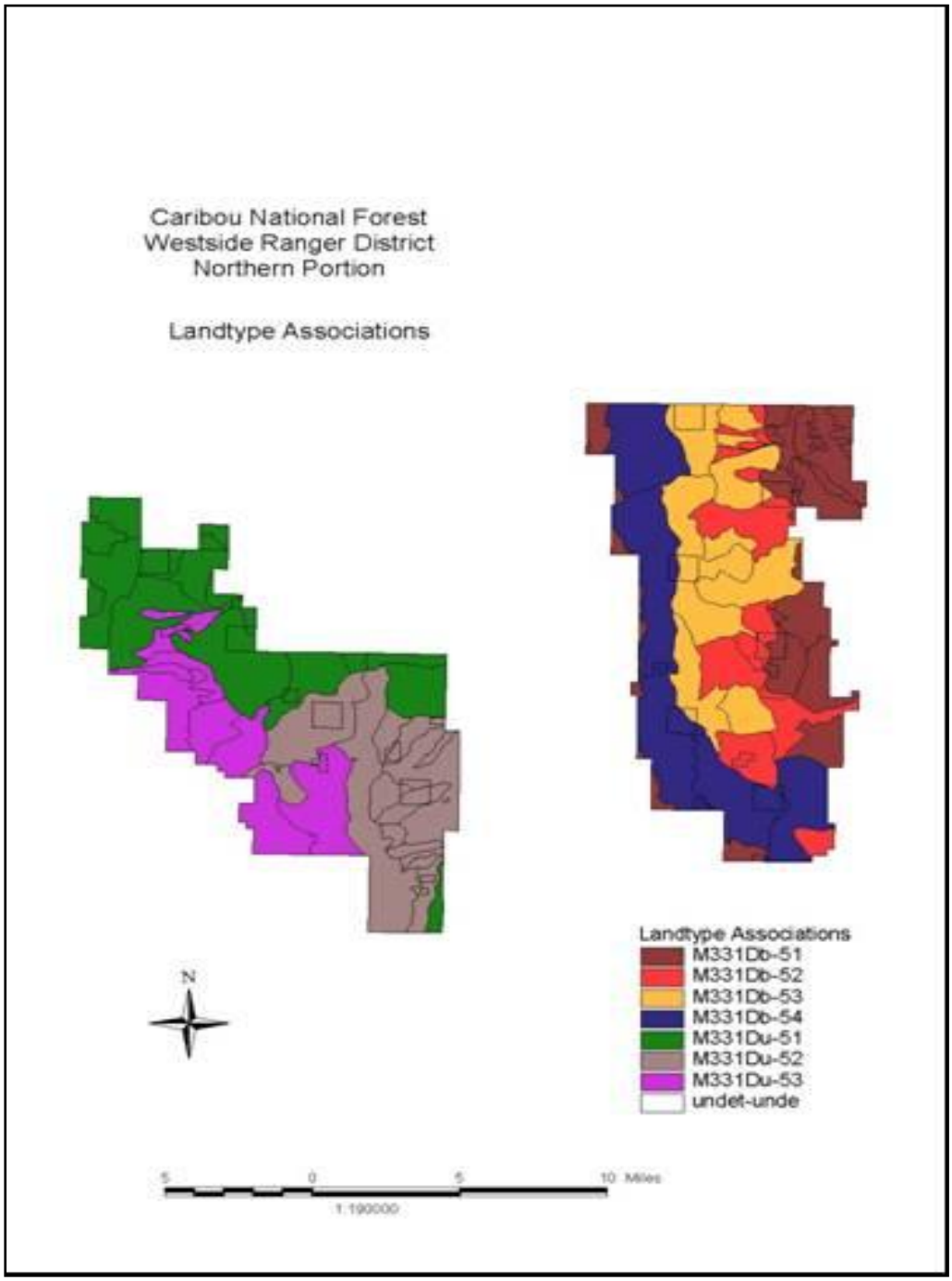


Figure 2: Lower Portneuf Watershed Analysis Landtype Associations

Physiography

The landforms within the watersheds consist mainly of foothills, toeslopes, canyons, ridges and mountain sideslopes. Elevation ranges from a high of 8,664 feet at the summit of Scout Mountain to a low of 4,400 feet at the Portneuf River bottoms. Slopes range

from nearly level in riparian areas to over seventy percent on very steep mountain sideslopes. Drainage patterns are dendritic with moderate to high dissection. Some drainages are structurally controlled by bedrock. Some drainages in the watershed are intermittent; however, major streams are perennial such as Mink Creek, Gibson Jack Creek, Walker Creek and Indian Creek. Aspects are generally east and west with southeast and southwest aspects caused by the trending slopes of the watershed toward the north and the Scout Mountain/Old Tom Mountain in the southeast corner of the watershed. Uplift and block faulting followed by fluvial, colluvial, residual and slope erosion geomorphic processes have helped shape these landforms.

Parent Materials

Geologic information for the watershed was collected from several publications and maps (Rember and Bennett 1979; and Ross et al. 1967). Parent materials are mostly Cambrian and Precambrian age quartzite, limestone, shale, and argillite. Blackrock Canyon limestone has some metadiamictite associated with it in the Old Tom Mountain area. The foothills have pediment gravels parent materials. A deposit of rhyoite occurs near Moonlight Creek on the west side of the watershed. Soils that form from these parent materials have inherently productive characteristics. Although some areas within these watersheds exhibit mass instability (from Crystal Summit down to Blind Spring), most of the watershed is considered to be stable.

What disturbance regimes influence the site productivity and the rate of soil loss in the watershed and what are the soils physical characteristics that influence site productivity?

Natural disturbance processes are fire, intensive rainstorms, flooding in the drainageways, and insects and disease. Fire occurs historically every 20 to 100 years depending on vegetation type. Human caused disturbances include recreation and road construction, fire, timber harvest and grazing.

Wildfire has potential to adversely affect soil quality by causing severe burn conditions in soils. Characteristically, an area burned at high severity has extensive exposed mineral soil, often greater than 80% (Wells *et al*., 1979; Robichaud *et al*., 2000).

Land Types and Soils

The Lower Portneuf/Garden Creek-Marsh Creek/Lower Bannock Creek watersheds have areas with unstable landforms that sometimes show active landslides (USDA-FS 1990). There are 12 land types on the Forest in this watershed. Soils have also been mapped off-forest by the NRCS and information from the Bannock County, Power County, and Fort Hall soil surveys can be used to make soil interpretations for those portions of the watersheds. For purposes of this characterization, soils are broken into three major landform groupings for simplification. Soil map units (Land Types) are described in relationship to 1.) stable loess covered mountains and foothills, 2.) unstable mountains and foothills, and 3.) upland basins and ridges. Soils that formed from the geologic parent materials listed above have base saturation and cation exchange capacity that provides

relatively high natural fertility. Because many of the soils in this watershed formed from geology containing quartzite, shale and limestone, they have silty and sandy soil textures that are dominant in soil profiles. Clayey soils are usually associated with alluvial landforms but are found in all locations where residual development has occurred. These kinds of soils have high erosion potential and may produce high levels of sediment when erosive conditions occur. Following in Figure 2 is the land type/soil map of the watershed portraying the soil survey on National Forest System lands. No information is shown for private land although they have been mapped by the NRCS. See Appendix for complete list of land types and soil interpretations.

Land Types Associated with Stable Loess Covered Mountains and Foothills

Soils that formed on stable loess covered mountains and foothills are Land Types 045, 303, 408, 410, 476, 557 and 913. Soils in these Land Types range from moderately deep to very deep (20" to >60") with minor amounts of rock outcrop located on the ridges and steeper mountain sideslopes. These soils have loess influence and often have calcium carbonates in the soil profile. They have moderate to high erosion hazard which increases if ground cover is disturbed. Because calcium carbonates occur in the soil profile, site productivity can be greatly reduced if the topsoil is eroded away. Appendix S provides the soil interpretations for soils found on the National Forest. Soil interpretations for the rest of the watershed can be found on WebSoilSurvey at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

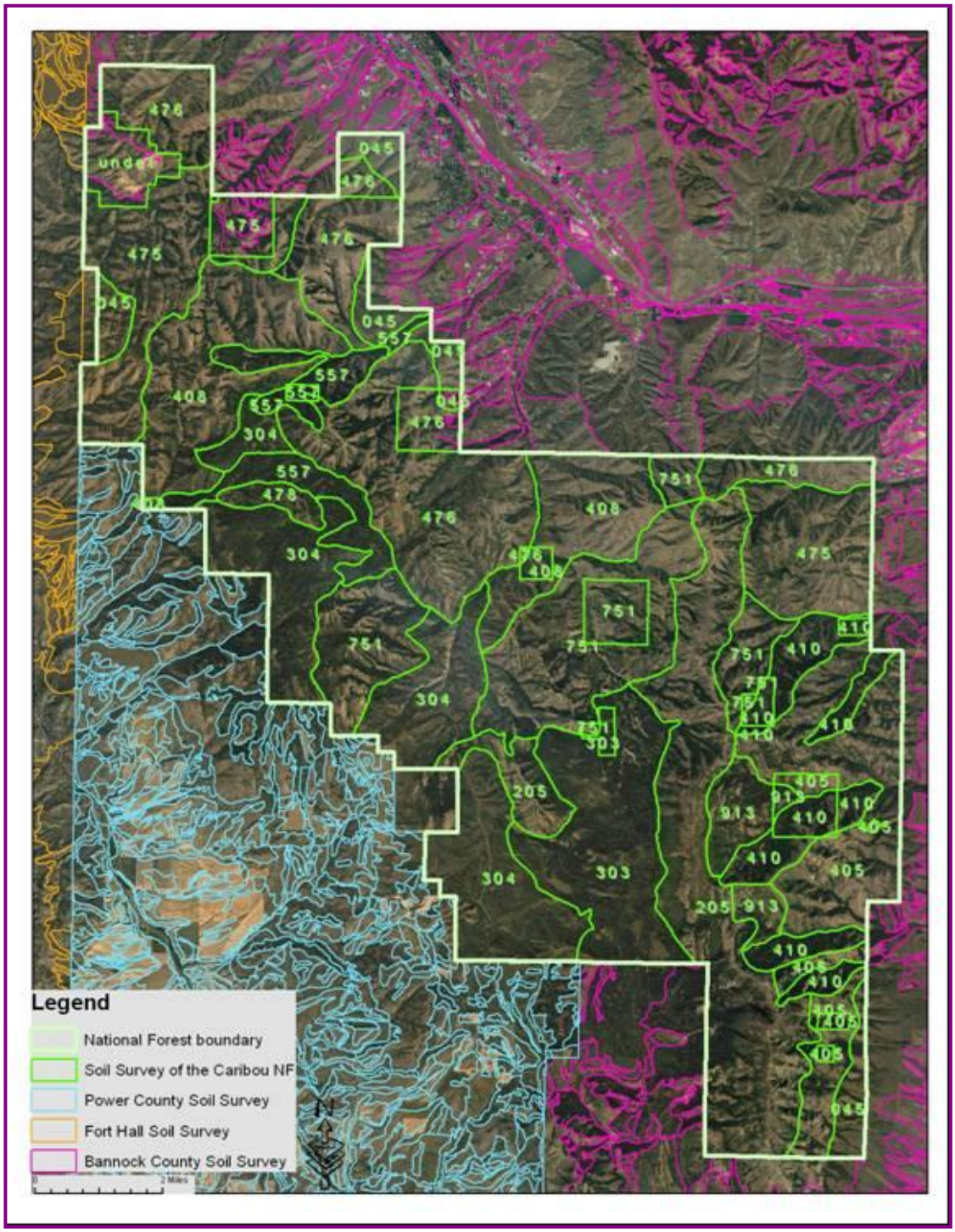


Figure 3: Soils Map of the Lower Portneuf/Garden Creek-Marsh Creek/Lower Bannock Watersheds (by KKleinschmidt, 2009).

Land Types Associated with Unstable Mountains and Foothills

On the National Forest within the watershed, unstable mountain and foothill landforms occur where clay has developed in the subsoil. Soils that formed on the unstable

mountains and foothills are generally deep to very deep (20” to >60”) with some rock outcrop located on the steeper mountain sides. Land types that have been mapped as unstable or marginally unstable in the upper watershed are land types 304 and 475. About 6,163 acres are represented in land type 304 and 5,120 acres in land type 475 in the watershed. Although these soils formed on steeper landforms, they have moderate to low erosion potential and have soil loss tolerance levels ranging from 2 to 4 tons per acre per year. They have higher potential to erode when they lose their protective ground cover. The potential is highest for mass movement on these landforms when soils become saturated with water.

Land Types Associated with Upland Basins and Ridges

Soils that formed on upland basins and ridges are land types 474, 205 and 751. They are almost always very deep (>60”) in the basins and shallow (<20 inches) on the ridges. Basin and riparian soils are influenced by wetness during some period of the year. Riparian vegetation such as willows and sedges grow in most of the riparian soils. Soils on terraces may be affected by grazing livestock and wildlife, recreation, roads and influences from upland conditions. Some areas are susceptible to down-cutting which often lowers the water table. When this occurs, riparian vegetation is gradually replaced by upland species such as sagebrush. Most riparian soils appear to be in a productive condition in the watershed but some down-cutting, gully erosion and trampling in riparian areas has been observed.

What has been the effect on the soil resource from past management practices such as prescribed fire, timber harvest, recreation use and livestock grazing on the watershed?

Recently, prescribe fire treatments have been applied to approximately 6,500 acres on the National Forest portion of the watershed since 2004 to reduce fuel loading. These treatments have also included some mastication of vegetation and were monitored for soil disturbance (Tepler 2005). Monitoring results indicated that these treatments cause very little detrimental soil conditions, however there was a concern about the depth of the chip piles.

Photo 1: Geo-Track mulching near Bannock GS

Photo 2: After mulching.

Roads and trails construction has also increase within the watershed within the last 10 years. These activities have some of the greatest potential to cause erosion. Recreation use from camping and hiking has also had minor effects on soil disturbances. Livestock grazing has remain relatively constant over the past 10 years having the largest impact on riparian soils, livestock salting areas, corrals and livestock trailing. These disturbances are not extensive in the watershed and have had minor impact on soil conditions based on soil monitoring. Timber harvest has disturbed areas but most soils remain productive in the watershed. Approximately 728 acres have been harvested since 1970.

Landslides have affected some infrastructure in the watershed. Bannock highway 43A crosses a landslide prone area near the junction of the South Fork of Mink Creek. Continual maintenance is required on this highway due to landslides.

Table 1: Caribou National Forest Pre-settlement Fire Frequency

Cover type	**Mean Fire Frequency (years)**
Juniper	19
Limber pine	19
Mountain Shrub	19
Sage/grass	19
Douglas-fir	53
Aspen	69
Subalpine fir	97

After Barrett, 1994

Following is the minimum, maximum and average production for the habitat types that represent this sagebrush cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 2: D-5 Production and Site Data for Sagebrush Habitat Types after Hironaka, et al., 1983.

	Production Potential lbs/ac/yr			**Site Condition percent bare soil**		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
ARNO/AGSP n=12	300	1600	718	15	40	29
ARAR/AGSP n=10	250	659	463	3	40	19
ARTRV/AGSP n=13	300	1100	680	10	50	23
ARTRV/FEID n=3	1400	1800	1536	9	22	15
ARTRV/STCO2 n=9	240	1600	995	4	42	19
ARTRV/SYOR/AGSP n=72	130	1800	830	7	60	24
ARTRV/SYOR/FEID n=25	230	2000	1193	0	55	24
ARTRV/SYOR/CAGE n=28	500	2505	1079	13	50	26
ARTRSP/BRCA n=32	600	3500	1477	0	50	20
ARTR2/AGSP n=9	287	1681	1010	12	42	22

Following is the maximum, minimum and average production for the habitat types that represent the aspen cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 3: D-5 Production and Site Data for Aspen Habitat Types after Mueggler, 1988.

	Production Potential lbs/ac/yr			**Site Condition percent bare soil**		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
POTR/SYOR/CARU n=51	300	2300	1022	0	25	11
POTR/SYOR/THFE n=16	250	1900	1256	0	35	15
POTR/ARTRV/FEID n=7	656	1900	1087	15	45	33
POTR/AMAL-SYOR/CARU n=51	367	2000	1255	0	40	11
POTR-PSME/AMAL n=6	499	800	585	0	10	3
POTR-PSME/SYOR n=11	200	2000	1043	0	40	12
POTR-PSME/CARU n=24	400	1600	728	0	25	9

Following is the maximum, minimum and average production for the habitat types that represent the conifer cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 4: D-5 Production and Site Data for Conifer Habitat Types after Steele, et al., 1983.

	Production Potential lbs/ac/yr			**Site Condition percent bare soil**		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
PSME/CARU, PAMY n=13	400	1300	704	0	15	5
PSME/CARU, CARU n=3	500	1000	733	0	10	5
PSME/ACGL, PAMY n=5	200	1029	571	1	25	15
PSME/SYOR n=10	602	1900	1222	0	20	10

Following is the maximum, minimum and average production for the juniper cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 5: D-5 Production and Site Data for Juniper Cover Type.

	Production Potential lbs/ac/yr			Site Condition percent bare soil		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
JUOS/SYOR/AGSP n=9	200	700	409	5	47	27

Following is the maximum, minimum and average production for the mountain brush cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 6: D-5 Production and Site Data for Mountain Brush Cover Type.

	Production Potential lbs/ac/yr			Site Condition percent bare soil		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
PUTR/AGSP n=15	349	1649	890	7	45	28
PRVI/BRCA n=53	500	2800	1252	5	80	26
SYOR/AGSP n=15	250	1550	793	7	40	21
SYOR/AGTR n=7	400	1700	1014	10	25	20

Following is the maximum, minimum and average production for the bigtooth maple cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 7: D-5 Production and Site Data for Bigtooth Maple Cover Type.

	Production Potential lbs/ac/yr			Site Condition percent bare soil		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
ACER/SYOR/AGTR n=6	425	1400	793	14	90	31

Following is the maximum, minimum and average production for the curlleaf mountain mahogany cover type on the Pocatello Ranger District of the Caribou National Forest taken from range analysis studies.

Table 8: D-5 Production and Site Data for Curlleaf Mountain Mahogany Cover Type.

	Production Potential lbs/ac/yr			Site Condition percent bare soil		
Habitat Type	***Min***	***Max***	***Ave***	***Min***	***Max***	***Ave***
CELE/SYOR/AGSP n=34	200	1400	642	10	55	27

Geology and Minerals

The lower Portneuf River watershed lies within the Basin and Range Physiographic Province. This area is dominated by relatively high, steep-sided mountains, with broad intervening valleys. The mountain ranges of the study area (including the Bannock Range and southern end of the Pocatello Range) consist mostly of Pre-Cambrian, low-grade metamorphic rocks (quartzite being the most abundant), lower Paleozoic rocks (generally marine limestone, shale or dolomite), Tertiary rocks (generally volcanic ash or basaltic lava flows), and recent alluvial, fluvial, and windblown sediments (predominantly in the valley bottoms).

The geologic history of the area is essentially that of the Cordilleran miogeosyncline, a large geologic trough that developed off the North American craton (continental core). Over time, the trough received thousands of feet of sediments shed from the continent and precipitates from the marine waters. Some of these sedimentary rocks are known to contain invertebrate fossils.

In Triassic times, the area to the west was raised in a mountain building event that destroyed the trough. In late Jurassic through Eocene times, compressional forces generally folded and faulted the existing rocks. In some cases, thrust faults (generally where older rocks are pushed up and over younger rocks) formed. The thrust faults transported thrust plates 10 – 20 miles to the east, creating what is often referred to as the overthrust belt.

The episode of crustal compression was followed by crustal extension, in which the area was pulled apart. This crustal extension is continuing at present, which puts the area in the Intermountain Seismic Belt. This extension caused numerous north-south trending, high-angle normal faults that allowed large blocks to drop relative to adjacent blocks, forming the Basin and Range province characteristic of western Utah, most of Nevada, and southern Idaho (Robison, 2006). Portions of the thrust belt (including the analysis area) have been "overprinted" by Basin and Range type faulting.

Large volcanic centers to the west of the analysis area spewed large amounts of volcanic ash into the air, with portions of the area (mainly in the East Fork Mink Creek) receiving large deposits of the ash. Some of these ash deposits contain fossils.

The trace of the Yellowstone Hotspot lies just a few miles north of the watershed area. Volcanism, some associated with the hotspot, occurred in the general study area, leaving igneous rocks (both intrusive and surface flows) on and near the study area.

Lava flows originating from volcanic vents near the town of Bancroft, Idaho flowed down the ancestral Portneuf valley about 500,000 years ago, partially filling the valley bottom. The remnants of these flows are present along Marsh Creek and Portneuf River from south of McCammon to Pocatello.

About 14,500 years ago, the natural outlet works from the Late Pleistocene Lake Bonneville collapsed, sending a monstrous flood from the Red Rock Pass area (about 25-30 miles south of the analysis area) through Marsh Valley, the Portneuf Gap, through Pocatello Valley, and out into the Snake River Plain. Maximum flows in the flood event are estimated to be about 15,000,000 cubic feet per second (Hackett, personal comm., 1987). This huge flood scoured out many of the sediments present in Marsh Valley and the lower Portneuf valley, including removal of some of the lava flows. As the flood waters reached the area now occupied by Pocatello and the Snake River Plain to the north, they spread out, decreased velocity, and began depositing much of the larger material being transported (boulders up to the size of small cars).

Mineral Resources

Oil and Gas: The study area lies in the Eastern Great Basin oil and gas Province (US Geological Survey 2005). Hydrocarbons have been produced from this province in Nevada and southern Utah, but not in Idaho. Oil/gas production in this province is usually associated with the thrust faults. Several small thrust faults are present in the study area, but high subsurface temperatures, general lack of good source and reservoir rocks, and other geologic factors necessary for the formation and accumulation of hydrocarbons appear to generally be lacking in the study area (Robison 2006). Three oil/gas exploratory wells were drilled about 4-6 miles southeast of the study area in Marsh Valley in 1927, 1928, and 1958. The deepest of the three wells was only 3,095 feet deep (Breckenridge 1982). All three wells were plugged and abandoned. No other wells have been drilled within 10 miles of the NFS lands in the analysis area.

Although most of the study area was leased for oil/gas in the late 1970s and early 1980s, there have been no oil or gas leases in the area within the past 20 years, nor has there been any oil/gas related seismic exploration in the area during that period. The BLM has not received any expressions of interest for oil/gas leasing for NFS lands in the study area within the past 20-25 years. The oil/gas occurrence potential is considered low for the area (Robison 2006), with the development potential even less.

Phosphate: No phosphate resources are known to occur at or near the surface within or near the study area.

Locatable Minerals: The Fort Hall Mining District was originally defined in 1908, and includes most of the Bannock, Pocatello and Portneuf Ranges (750 square miles). It contains at least seven prospect or small mine areas; Moonlight, Great Western, Chinks Peak, Portneuf Gap/Blackrock Canyon, Inman Creek, Fort Hall Mine, and Bell Marsh Queen. The Moonlight and Inman Creek areas are outside the analysis area. Mining in the district was chiefly for copper, but some lead, silver and very minor amounts of gold were also recovered. Overall production of any of these commodities was minor. Other than the Inman Creek prospect, none of the others had measurable production after World War I. The largest of the mines was the Fort Hall Mine, just north of the Forest boundary, which had about 8,000 feet of underground workings (Darling 1985). Most of the ores were sulfide ores, thus having the potential to generate acid rock drainage.

Although the analysis area once contained over 300 mining claims (most of them in the Valve House Draw area), there are no active mining claims present in the HUCs being assessed as of April 9 and 14, 2009 in T. 6 S., R. 34-5 E., T. 7 S., R 34-6 E; T. 8 S., R. 34-6 E., T. 9 S., R. 34-6 E., and 10 S., R, 34-6 E., Boise Meridian, according to the BLM LR2000 mining claim database.

From 1987 to 1992, gold exploration drilling was done in the Valve House Draw area by three different companies. Deposits with an estimated reserve base of more than 100,000 ounces of disseminated gold were discovered, but it was felt that production of the low grade ore may not be profitable, plus there were land ownership issues, and mining may have caused excessive surface disturbance and/or environmental impacts (Valcarce, personal comm. 1993). No further development or exploration has occurred on that deposit since that time and all of the mining claims in the area have been closed by the BLM.

In 1987 an exploration drilling program was proposed for the Bell Marsh area, with holes on both the patented mining claim and on adjacent unpatented claims. The USGS topographic map of the area also shows two mineral prospects about one mile north of the Bell Marsh patented claim.

In 1988, in the very northwest corner of the NFS lands in the watershed, mineral exploration was proposed and conducted.

USGS topographic maps of the area show seven mineral prospects along the north edge of the NFS lands overlooking the Portneuf Gap.

Relatively pure quartzite was mined from private land (patented mining claims) on the western edge of area to supply silica for flux in the FMC elemental phosphorous plant that was located just north of the area. However, it is not anticipated that future mining of silica at that site will occur, as the FMC plant was closed several years ago, the plant dismantled, and the plant site and silica mine at least partially reclaimed.

An active cement plant is located in the Portneuf Gap near the town of Inkom. Limestone and other rock materials used in the production of cement occur behind the

plant, where they are actively mined/quarried. Production from the plant is expected to continue; adequate rock/mineral reserves for future production appear to be present on-site.

At least one other abandoned prospect adit is known, situated in the bottom of Mink Creek Canyon, just north of the turn off to the South Fork Mink Creek. This adit is small, difficult to see from a distance, mostly flooded, and does not appear to pose much of a safety risk. Its depth is unknown to the author, but is not considered very deep because of the small amount of waste rock present at the adit. It is located on the breccia zone of a large fault that crosses Mink Creek Canyon.

Some gold panning has occurred in the past in Mink Creek. So far as known by the author, past placer gold recovery in the drainage included only very small gold particles (and very few of them), generally recovered by panning. Recent interest has been expressed for gold suction dredging in Mink Creek. However, the creeks within the Forest boundary in the watershed are currently closed to the State's "one-stop" permitting process for recreational suction dredging.

Despite all of the above mentioned locatable mineral occurrences and exploration activities, there are currently no active mining claims present on NFS lands within the watershed.

Geothermal Resources: There has been a general interest in southeast Idaho for geothermal resources because of past volcanic activity and its proximity to the trace of the Yellowstone Hotspot. However, there are no hot/warm springs documented on NFS lands within the watershed. Downata Hot Springs is located several miles south of the study area, and Lava Hot Springs is located several miles to the east. Both of these springs are currently used for direct application for swimming/recreation facilities and heating. Although there may be higher heat sources present at depth below the watershed, there appears to be a higher potential for geothermal development present in the Snake River Plain (Mabey 1983). There are no geothermal leases present or applications pending for FS or BLM administered lands in the watershed. There appears to be little development potential for geothermal resources within the study area.

Mineral Materials: Mineral materials (sand, gravel, stone, etc.) have been produced from the area in relatively small quantities (except in connection with the cement plant – which is outside NFS boundaries). Fill material, or possibly road surfacing material, are present on NFS lands in the area, like Lead Draw and near the Bannock Guard station. Old stone quarries are present near the bottom of Mink Creek on NFS lands (south of the guard station), but this rock source has not been utilized for many years. Slate from private lands in the canyon bottom has been excavated, but limited amounts of material appear to have been removed. New, presently undeveloped, sources of material may be present, but very few have been located or evaluated for development.

Rock suitable for personal use landscaping purposes also appears to be present in the watershed analysis area. There may be areas in the watershed where landscaping rock

sources could be developed. A search could be conducted for such a source and an assessment as to its development potential could be made. However, because of safety concerns, recreation use, and general scenic values, development of this resource in the area may not be compatible with current uses/values. Sources for this type of material are available outside NFS boundaries.

Active mineral development on NFS lands in the watershed is currently minimal to non-existent, and is not expected to increase in the foreseeable future for locatable or leasable minerals. An oil/gas leasing EIS to assess leasing throughout the entire Caribou NF was started in 2006, and included the NFS lands in this watershed; that analysis was put on hold in 2008. Although future leasing in the watershed could occur (if/when the leasing analysis is completed), and future exploration and/or drilling is possible, it is unlikely to occur in the foreseeable future. The locatable minerals present are not expected to be actively explored for or developed within the foreseeable future (other than possibly minimal gold recovery from placer deposits). Geothermal resource exploration or development is not expected to occur on NFS lands in the watershed. Future development potential for mineral material sites in the watershed does exist.

Erosion Processes

Erosion is most affected by soil types, slopes, vegetative cover, aspect, precipitation amounts, etc. The parent rock types have a major effect on the type of soils developed, but other than that and topography, the geology will not dictate the amount of erosion. Mining, which is related to the geology, could have an impact on erosion in disturbed areas, but no mining is anticipated on NFS lands in the study area. Since nothing can be done to change the existing geology, no further discussion is presented here.

Hydrology

Surface and especially subsurface geology are important to the regional hydrology of any area. Faults and fracture systems many times act as "conduits" for the transmission of water (either as avenues of recharge to the subsurface or for discharge to the surface in the form of springs or seeps). Faults can also intercept or block groundwater flow through an aquifer. However, there is nothing unique or outstanding about the geology and its relationship to the hydrology in this watershed, so it will not be discussed further in this geology section.

Stream Channel

Geology can have a significant influence on stream channels, depending on the type of bedrock, depth to bedrock, and/or structural controls on topography. The Portneuf River and perennial tributaries in the analysis area rarely flow directly over bedrock, so the major factors influencing the stream channels appear to be more appropriately addressed in the soils, vegetation, hydrology, and other sections.

Water Quality

On most of the Caribou NF, geology is not a major factor that negatively affects water quality. However, with the presence of sulfide mineralization (although minor in this watershed) past mining activities could affect the water quality, especially for the presence of metal ions. However, according to the Idaho Department of Environmental Quality (Hull, personal communication, 1995), the water quality from the Fort Hall mine area (including water discharged directly from the collapsed adit) meets applicable water quality standards.

Species and Habitats

The geology of the watershed will play a significant role in the types of soils present. The type of soil present affects the type of vegetation which in turn plays a major role in the wildlife habitats present. These factors affect the plant and animal species present and/or their habitats. However, the geology is not going to change during the life of this analysis. Since there are no treatments for the geology available, additional discussion will not be done in this section.

Human Uses

Essentially no direct human uses of the mineral resources are occurring on NFS lands in this watershed. If that current use level continues, there will be no real disturbance to the watershed for the recovery of mineral resources.

A small amount of rock-hounding, some associated with fossil collecting, is occurring in the watershed. This is not a major activity at this time. There may be opportunities for interpretive activities and/or displays associated with the geology and minerals, and even the possibility to establish recreational invertebrate fossil (trilobite) and/or fossil plant collecting area(s). However, known localities have generally produced few or fragmentary specimens, generally of limited interest to the recreating public.

WATER

A watershed is "that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community." – John Wesley Powell

Erosion Processes

Erosion processes within the analysis area are separated into two major categories: hillslope and in-channel erosion. The dominant hillslope erosion processes are sheet wash and rill erosion resulting from Horton overland flow. Rainsplash erosion occurs to a lesser extent on National Forest System (NFS) lands, but it can be a larger factor on private agricultural lands. Aside from the physical and chemical attributes of the soil, ground cover is a major factor for controlling hillslope erosion and overall watershed health. Gully erosion may transition between hillslope and in-channel erosion. Streambank (lateral) and streambed (vertical) erosion are the dominant in-channel erosion processes. Factors that control stream channel erosion include riparian area health and overall watershed health, which are also highly related to land use practices.
Land use and ground cover are critical factors controlling erosion processes. The majority of land base within the analysis area is private (36%), followed by the Fort Hall Indian Reservation (28%), NFS lands (21%), and BLM (14%). Land uses on private and Reservation land consist of agriculture, livestock grazing, and residential development (to a lesser extent on Reservation). NFS and BLM lands represent multiple use management strategies.

Hydrology

The analysis area contains snowmelt dominated systems. Annual peak streamflow typically occurs between March and May, but it may occur as early as December and as late as June. US Geological Survey (USGS) gage data at Marsh Creek indicate peak runoff as early as December (1965 &1997) and as late as June (1967). Similar hydrology is observed throughout the analysis area. A USGS gage on the East Fork Mink Creek between 1963 and 1971 recorded annual peak runoff occurred between February and June for that period, but it most often occurred in May (4 out of 9 years).

Although snowmelt typically controls the annual peak streamflow, summer and early fall thunderstorm events are common in the upper watersheds. Those rainstorm events produce short duration spikes in runoff. Early spring rain events on top of an existing snowpack have a greater probability of causing an annual peak streamflow event. Annual peak streamflow is a function of drainage area. **Figure 4** and **Figure** illustrate the annual peak flows for the larger drainages of Marsh Creek and the Portneuf River at Pocatello (drainage areas of 353 mi^2 and 1,250 mi^2 respectively). Annual peak flows in Marsh Creek range from less than 60 cfs (cubic feet per second or ft^3/s) up to 1,120 cfs. Annual peak flows in the Portneuf River have ranged from less than 300 cfs (cubic feet

per second or ft^3/s) to 2,990 cfs. Historic USGS gages on East Fork Mink (Figure 6) and Inman Creeks (Figure 7) provide data for smaller drainages (14.7 mi^2 and 8.2 mi^2 respectively).

Figure 4: Annual peak flows: Marsh Creek gage.

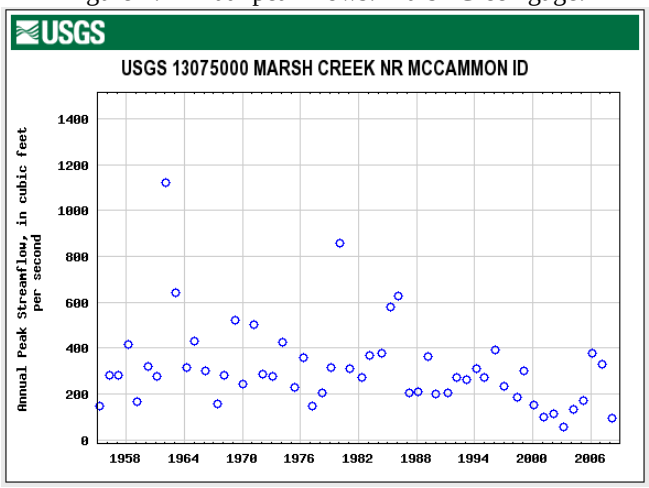


Figure 5: Annual peak flows: Portneuf River at Pocatello.

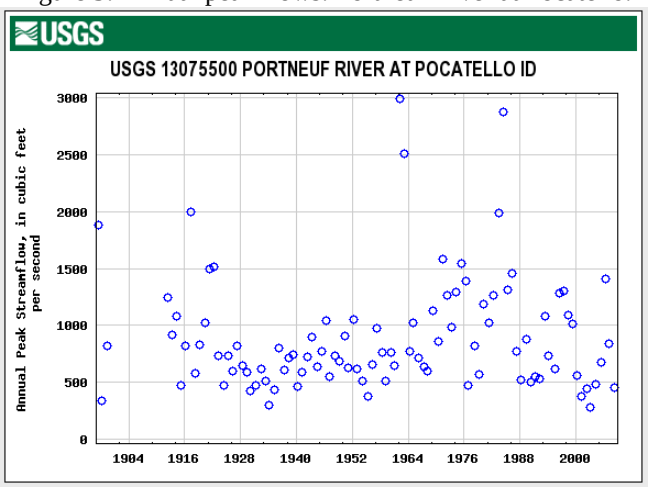


Figure 6: Annual peak flows: East Fork Mink Creek gage.

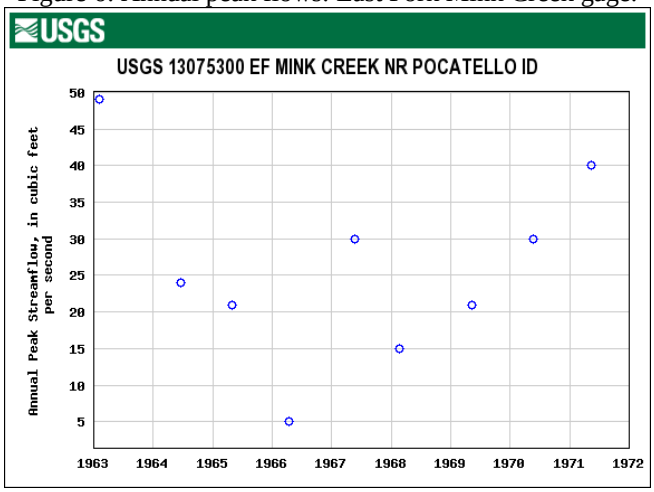
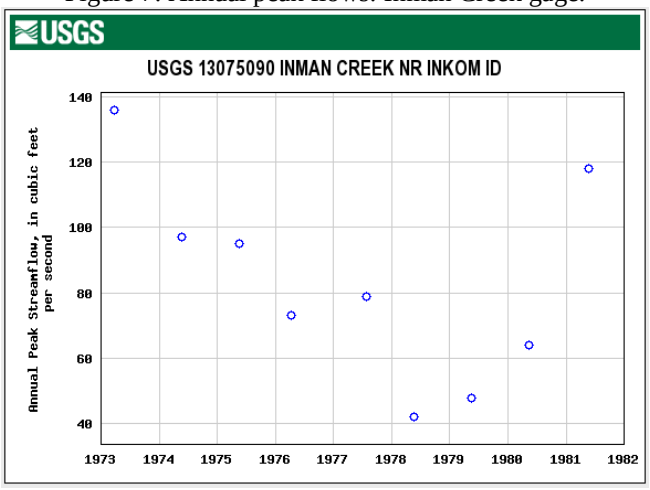


Figure 7: Annual peak flows: Inman Creek gage.



Climate

The Portneuf River Subbasin climate is semiarid mid-latitude steppe; average annual precipitation in Pocatello is 12.7 inches; annual temperatures range from an average July maximum of 89.5°F to average January minimum of 17.9°F (Ray 2009, Figure 8). **Figure** shows a similar climate for Fort Hall, Idaho nearby.

Figure 8: Pocatello climate summary for 1899-2008 (Ray 2009).

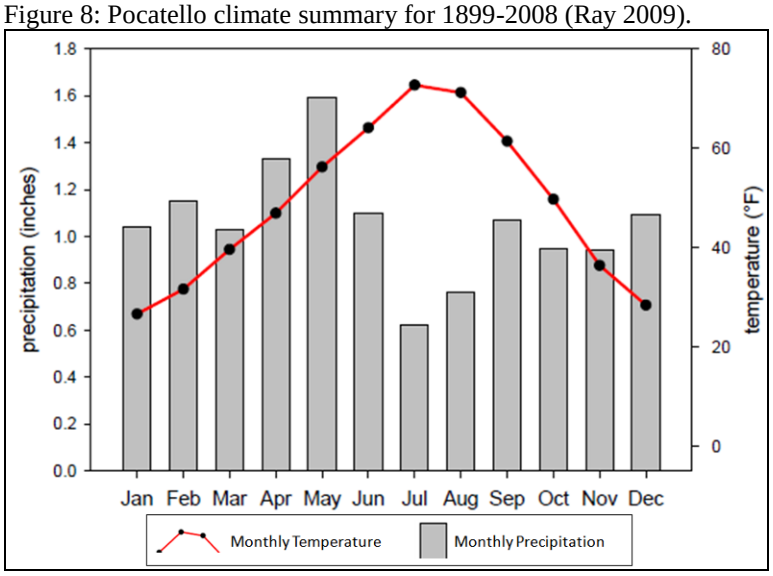


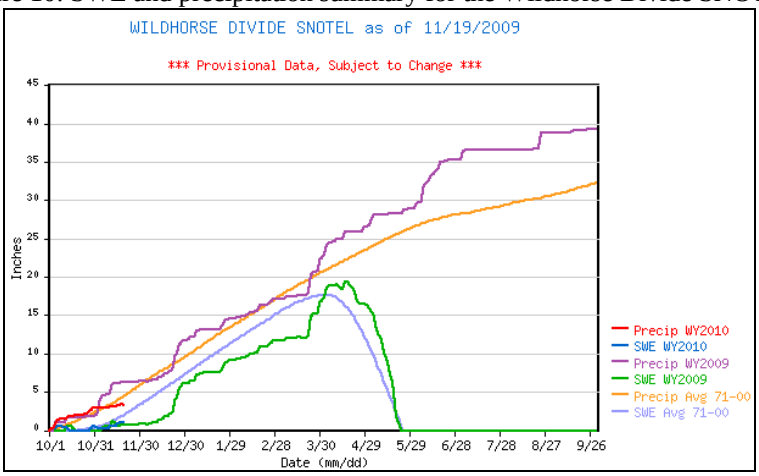
Figure 9: Climate summary for Fort Hall, Idaho.

Month	Mean Maximum Temperature (°F)	Mean Minimum Temperature (°F)	Mean Precipitation (in)	Number of wet days
January	32.7	16.2	0.81	8.1
February	39.5	20.0	0.81	6.7
March	48.3	24.9	0.95	6.8
April	59.5	31.5	0.90	5.3
May	69.0	39.3	1.42	7.1
June	78.5	46.6	1.08	5.4
July	87.3	52.0	0.58	2.6
August	85.9	50.0	0.75	3.3
September	76.2	41.4	0.76	4.2
October	63.9	31.9	0.90	4.3
November	46.0	24.0	0.97	7.0
December	34.9	16.8	0.87	7.9
Annual			10.81	68.8

Forest Service WEPP Interface: Rock:Clime
http://forest.moscowfsl.wsu.edu/cgi-bin/fswepp/rc/rockclim.pl

Annual precipitation is a function of elevation, with most precipitation occurring during winter and spring. In Pocatello (elevation of ~4,500 feet), 57% of the moisture occurs in the winter and spring (Ray 2009). Figure 10 provides a summary of the snow water equivalent (SWE) and precipitation at the Wildhorse Divide SNOTEL site operated by the Natural Resources Conservation Service (NRCS). Elevation at the SNOTEL site is 6,490 feet. The SWE represents the depth of water in the snowpack, if the snowpack were melted. Average annual precipitation at the site is nearly 40 inches. Snow pack at the site typically begins in early November and lasts until late May.

Figure 10: SWE and precipitation summary for the Wildhorse Divide SNOTEL site.



Source: NRCS SNOTEL data at http://www.wcc.nrcs.usda.gov/cgibin/site-wygraph.pl?state=ID

Stream Channel

Following the Rosgen (1996) stream type criteria, most all stream types (A, B, C, E, F, and G) occur in the area except for D and DA. "D" channels may occur for short distances due to high sediment inputs, but these channels are not regularly observed in the analysis area. The most dominant types are A, B, and C channels that occur naturally

within the valley types observed throughout the area. Stream types of G are less frequent, but are naturally found on alluvial fans where smaller tributaries enter a larger valley. G and F stream types also occur where channels have been altered (e.g. urbanization, agriculture, stream straightening, and flood control projects). Many streams in the analysis area also have current or historic beaver activity.

Ray (2009) provides an excellent summary of the entire Portneuf River subbasin. The following excerpts describe the Portneuf River within the Lower Portneuf River Subwatershed:

"The Portneuf River is a 5th-order river, approximately 100 miles long." In the Lower Subwatershed, "*The river then turns west for approximately 10 miles before flowing north approximately 40 miles to its confluence with Snake River at American Falls Reservoir (IDEQ 2001)."*

"In the City of Pocatello," … "approximately 1.5 miles of river was routed through a vertical-walled concrete channel as part of a U.S. Army Corps of Engineers (USACE) flood protection project completed in 1968 (Section 204, paragraph "Columbia River Basin", Flood Control Act of 1950). The construction of the channel resulted in the loss of approximately 4.1 miles of natural river channel by removing natural meandering and approximately 144 acres of riparian habitat. Moreover, the channel acts as a barrier to City Creek for trout and other fish (USACE 1992, IDEQ 2001) and has other significant, albeit indirect, effects on aquatic organisms by the disruption of energy fluxes between the stream and [lost] riparian habitats (sensu Laeser et al. 2005)."

"Another gaining reach includes a complex of 27 springs in the lower Portneuf River. This lower spring complex is roughly bounded by I-86 to the south and Siphon Road to the north (Perry and Clark 1990) and contributes approximately 225 cfs."

State Water Quality Standards and Best Management Practices (BMPs)

The Idaho Department of Environmental Quality (IDEQ) identifies surface water use designations (i.e. beneficial uses) and water quality standards (IDEQ 2009a). **Table 9** lists the beneficial uses within analysis area.

Table 9: Beneficial uses of waterbodies throughout the analysis area (IDEQ 2009a).

Waterbodies	Beneficial Uses
City, Gibson Jack, Mink, Indian, Walker, Bell Marsh, Goodenough, Garden, Rattlesnake, Clifton, Midnight, Michaud Creeks, & all other small or unnamed streams.	Coldwater Aquatic Life, Primary Contact Recreation, Agricultural and Industrial Water Supply, Wildlife Habitats, and Aesthetics - Protected for all recreational uses and the propagation of fish, shellfish, and wildlife, wherever attainable.
American Falls Reservoir	Coldwater Aquatic Life, Primary Contact Recreation, Domestic, Agricultural and Industrial Water Supply, Wildlife Habitats, and Aesthetics
Marsh Creek and Bannock Creek	Coldwater Aquatic Life, Secondary Contact Recreation, Agricultural and Industrial Water Supply, Wildlife Habitats, and Aesthetics
Portneuf River (Marsh Creek to American Falls Reservoir)	Coldwater Aquatic Life, Salmonid Spawning, Secondary Contact Recreation, Agricultural and Industrial Water Supply, Wildlife Habitats, and Aesthetics

Through a Memorandum of Understanding (MOU) with the State of Idaho, the Forest is responsible for implementing nonpoint source pollution control measures during all management activities (USDA FS 2008). The Idaho antidegradation policy pronounces

that the designated uses and the level of water quality necessary to protect those uses shall be maintained and protected. It is also Forest Service Policy to maintain or improve water quality (Caribou NF RFP and FSM 2500[1] (2520.3)). The State recognizes BMPs as an effective process for protecting beneficial uses and ambient water quality.

Impaired Waters (303(d) Listed) and Total Maximum Daily Loads (TMDLs)

The analysis area overlaps portions two subbasins: 1) Portneuf River and 2) American Falls. The IDEQ has identified several impaired water quality assessment units (AUs) within the analysis area; IDEQ has determined these waters are not meeting the specified beneficial uses. Section 303(d) of the federal Clean Water Act requires states and tribes to develop TMDLs for impaired waters (303(d) listed). A TMDL identifies pollutant level limitations with the goal of improving water quality in order for waterbodies to once again support beneficial uses.

The IDEQ is currently in the process of revising the Portneuf River TMDL (IDEQ 1999 & Ray 2009). The American Falls TMDL was revised in March 2009 (IDEQ et al. 2009). The Idaho 2008 Integrated (303[d]/305[b]) Report (IDEQ 2009b) also provides water quality information for the area. TMDLs are revised every five to ten years and the Integrated Report is updated every two to six years. Given the frequent flux of 303(d) and TMDL information, more on this topic is presented in Step 3, Existing Conditions.

[1] Section 2520.3 of FSM 2500 states: "Apply management practices that meet requirements for protecting, maintaining, restoring, or improving watershed conditions."

VEGETATION

Forested Vegetation

The analysis area is characterized by a arid area vegetation pattern. Tree cover is scattered and generally stand size is small. Wetter aspects support tree cover (north and east) while south and west aspects are sagebrush, mountain brush, juniper, and grass/forbs. Some later successional species such as subalpine fir can be found in the under story. Aspen stands are also common throughout the analysis area, and many of them show signs of encroachment by Douglas fir and some subalpine fir.

This watershed consists of varied dry vegetative cover types, Douglas fir, aspen, and various shrub species are scattered throughout the analysis area. The primary forest types on FS lands are aspen (11 percent) and Douglas fir (18 percent). This makeup consists of 30 percent forested and 70 percent non-forested vegetation. While this interspersion of forest with sagebrush, grass/forbs meadows and mountain brush provides for good diversity of plant species, there is not a good diversity in age classes.

Non-Forested Vegetation

Approximately 70% of the analysis area managed by the Forest Service is characterized by non-forested vegetation (NFV). For the purpose of the analysis in this document, the NFV has been broken into four cover types; grass/shrub, mountain brush, riparian, mountain mahogany and mountain shrub (GIS data clipped by M.Mousel, 5/15/2009).

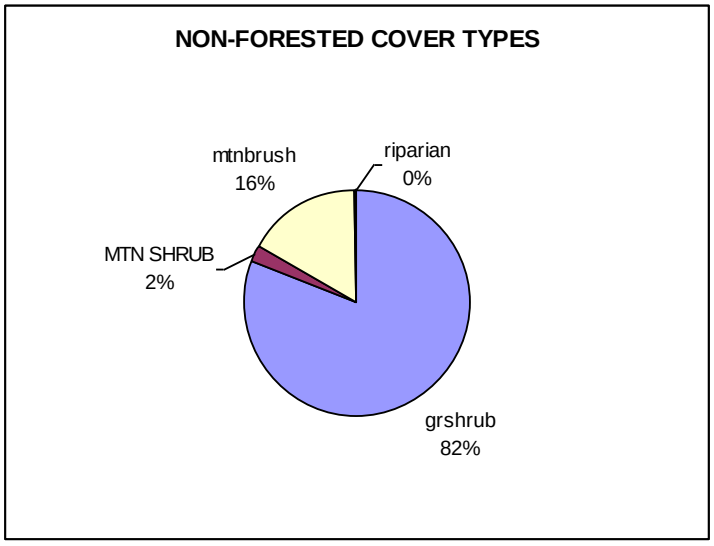


Figure 11: Non-Forested Cover Types

Table 10 lists the description and percent composition of the non-forested vegetation cover types managed by the Forest Service within the watershed analysis area.

Table 10: Composition of non-forested vegetation cover types managed by the Forest Service.

COVER TYPE	% COMPOSITION	DESCRIPTION
Riparian	<1%	Areas that are currently dominated by riparian species or water. This type includes a wide range of riparian types from wetland vegetation to patches of willows.
Grass/Shrub	82%	Also referred to as the Sagebrush/ Mtn brush complex. This type consists of a sagebrush overstory with a herbaceous understory.
Mountain Brush	16%	This type is comprised of greater than 5%: service berry, choke cherry, ceanothus and rose. Bitterbrush and snowberry often occur but are not considered to be part of the mountain brush component.
Mountain Shrub	2%	This type includes mountain mahogany and Rocky Mountain juniper (some Utah juniper in the south) and is often intermingled with sagebrush.

Weeds

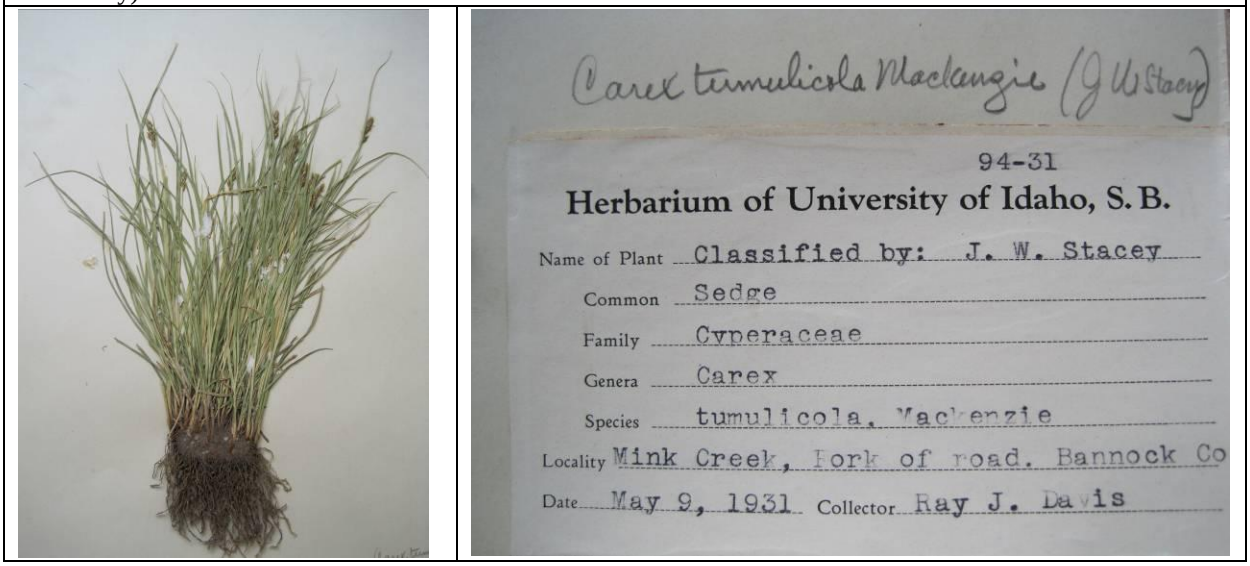
Noxious weed species can cause serious modifications to landscapes by decreasing species biodiversity, competing with native species, contributing to erosion, increased sediment loading in streams, and many other factors. Idaho has classified 57 species of noxious weeds for containment (Prather, 2008). Currently the Westside Ranger District treats weeds aggressively as specified in the Revised Forest Plan (2003) and Caribou – Targhee Noxious Weed Strategy (2005). Control of noxious and invasive species is done using integrated weed management tactics such as chemical and biological treatments. Species of concern that are being treated within the analysis area include; black henbane (*Hyoscyamus niger),* Canada thistle (*Circium arvence),* hounds tongue (*Cynoglossum officinale),* musk thistle (*Carduus nutans),* poison hemlock (*Conium maculatum),* dyers woad (*Isatis tinctoria),* spotted knapweed (*Centaurea stoebe),* and whitetop (*Cardaria draba).*

Rare Plants

Currently there are no known Threatened, Endangered or Sensitive (TES) plant species known to occur within the watershed analysis area. There are, however, still rare botanical elements that are tracked by the Natural Heritage Network and the Idaho Native Plant Society within the watershed boundary. Described below are the rare plants and plant communities known to occur within the analysis area.

Foothill sedge (*Carex tumulicola*)

Photo 3: Photo of *Carex tumulicola* specimen and its herbarium label (Ray J. Davis Herbarium, Idaho State University).



Foothill sedge has never been relocated in the Mink Creek area based on a 1931 collection by Ray J. Davis (author of the Flora of Idaho) and there are questions concerning whether or not the herbarium label is correct (wrong label attached to the wrong plant?).

Foothill sedge, as the name implies, is an upland sedge. Habitat is noted as being "open, often grassy slopes and dry meadows".

Foothill sedge was designated Endangered in April 2008 in Canada based on a review of its status in Canada where it is known from only 10 localized and highly fragmented sites in southwestern British Columbia where it occurs in meadows and shrub thickets within Garry oak ecosystems, a critically imperiled habitat in Canada. The known range of the species extends from British Columbia south to Oregon and California.

Garrett's firechalice (*Epilobium canum* ssp. *garrettii (sym: Zauschneria garrettii))*

Photo 4: Garrett's firechalice and a Idaho Native Plant Society member taking photo

Garrett's firechalice is on the rare plant review list for the Idaho Native Plant Society. This means the species may be of conservation concern in Idaho, but there is insufficient information to establish a ranking. On a recent INPS outing this fall, a member pointed out its occurrence up Goodenough Canyon. It has a striking red flower that blooms in the fall blending well with the fall color of bigtooth maple. It is likely more common than currently thought within the watershed, but threats such as off-road vehicles, grazing and non-native invasive plants may be occurring.

Habitat is talus, rock crevices, and dry, open slopes from the foothills to middle elevation. The species known range is southeastern Idaho and western Wyoming through Utah to Arizona.

Big-leaved Sedge Plant Community (*Carex amplifolia*)

Photo 5: *Carex amplifolia* Photos of the inflorescence and the perigynia (Courtesy of USDA FS RMRS Boise Aquatic Sciences Lab)

Carex amplifolia dominates at least three small areas along Gibson Jack Creek in the RNA. It occurs on seepy, subirrigated ground at the base of slopes where the terraces are above the stream's high water. There is generally some standing water on the ground. Species diversity is low with *Equisetum hyemale* and *Habenaria hyperborea* being the most prominent associates. *Carex amplifolia* stands also form small communities in seeps on slopes above Gibson Jack Creek. This area has an aspect of 140 degrees with a 7% slope. Adjacent riparian communities are mostly dominated by *Cornus sericea*. Small (<25 sq. m) stands of *Carex utriculata* are also present. (Idaho Conservation Data Center Element Occurrence Record (Jankovsky-Jones, M. 2000. Field notes for Gibson Jack Creek)). The plant community also is documented for the West Fork of Mink Creek.

Cherry Springs Nature Area

Photo 6: Plant sign for Box Elder (*Acer negundo*) and location for the plant sign for ponderosa pine (*Pinus ponderosa*)

The Cherry Springs Nature Trail provides a great opportunity for education. The Westside District had signs made interpreting many of the plants growing along the trail. The plant list for the nature trail is located in the appendix of this document.

Noxious weeds and invasive non-native plants are an issue along the trail.

Research Natural Areas

There are two RNAs within the Watershed Analysis area: Gibson Jack RNA and the West Fork of Mink Creek RNA.

Research Natural Areas, as defined by the Federal Committee on Ecological Reserves (FSM 4063.43, para.1), are a physical or biological unit in which current natural conditions are maintained insofar as possible. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. However, under unusual circumstances, deliberate manipulation may be utilized to maintain the unique feature that the Research Natural Area was established to protect.

Gibson Jack RNA
Created: 1982
Size: 2210 acres
Elevation Range: 5400 – 7214 feet
Location: The RNA occupies the headwaters of Gibson Jack Creek.

Photo7: Historical Photos (A-L) of Gibson Jack RNA taken at the time of establishment (early 1980's).

Photo A: General view looking up the North Fork of Gipson Jack Creek. Extensive stands of aspen with intermixed Douglas fir are on left and grasslands and shrublands on right.

Photo B: From divide between the North and South Forks of Gipson Jack Creek looking down Gipson Jack Creek. Douglas fir trees in foreground and extensive shrublands in middle view.

Photo C: General view showing extensive sagebrush-grass communities and related shrubs such as mountain snowberry, bitterbrush, and chokeberry.

Photo D: An example of the Utah juniper/black sage/blebunch wheatgrass communities.

Photo E: A close view of the Utah juniper/mountain sagebrush/bluebunch wheatgrass community.

Photo F: General view of invasion of Utah juniper down a stony ridge.

Photo G: An example of the mountain sagebrush/mountain snowberry/mixed grass habitat type, mules ears wyethia phase.

Photo H: A beaver pond and house with surrounding aspen. Sagebrush on the slope beyond the pond.

Photo I: The bigtooth maple/creeping barberry habitat type.

Photo J: Inter-fingered stands of sagebrush and Douglas fir on steep north slopes.

Photo K: Beaver pond and house, and cut aspen on the North Fork of Gipson Jack Creek.


Photo L: Beaver ponds and aspen on the North Fork of Gipson Jack Creek.

Gibson Jack Creek RNA contains several shrub types. These include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*Artemisia nova*), Utah juniper (*Juniperus osteosperma*) and chokecherry-serviceberry (*Prunus virginiana-Amelanchier utahensis*) communities. The area also contains several forest types, including bigtooth maple (*Acer grandidentatum*), quaking aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), and subalpine fir (*Abies lasiocarpa*).

It includes a small drainage basin complete with streams, beaver dams, and ponds. Red-osier dogwood (*Cornus stolonifera*) dominates the riparian zone, with willows, including whiplash willow (*Salix lasiandra*), attaining prominence on the lower 0.25 mile. An unclassified forb-dominated community interrupts the red-osier dogwood and continues up the northerly fork to end of permanent water.

The mountainous country provides geologic, elevational, slope, and aspect variation. These result in great differences in vegetation. Forests cover most of the north-facing slopes while shrubs and grass dominate on southern slopes. Boundaries between vegetation communities are sharp and easily distinguished. The RNA is part of a city watershed, and as such, the area has been protected from most uses for over 75 years.

West Fork of Mink Creek RNA
Created: 1973
Size: 640 acres
Elevation Range: 5600 – 7000 feet
Location: The RNA is located midway up the West Fork Mink Creek drainage.

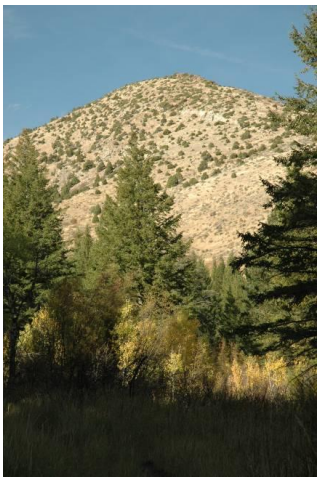



Photo 8: Looking "into" the West Fork of Mink Creek RNA from the West Fork Trail (photos taken fall of 2008; Photographer was not able to locate historical photos)

West Fork Mink Creek RNA is divided into two units with a buffer strip between the two along the old streamside road/trail. The two units are quite different and the site features a variety of vegetative cover types including Douglas fir (*Pseudotsuga menziesii*) and aspen (*Populus tremuloides*) forests on north-facing slopes and sagebrush-grass types on south-facing slopes. The upper slopes of Slate Mountain have a thin soil mantle with many exposed shale outcrops and support a predominantly black sagebrush-Sandberg's bluegrass (*Artemisia nova-Poa secunda*) association. About 10% of the upper slopes have a Utah juniper (*Juniperus osteosperma*) tree cover. The lower xeric slopes support the basin big sagebrush/Great Basin wildrye (*Artemisia tridentata* ssp. *tridentata*/*Elymus cinereus*) association and a variety of shrub species. The western portion of the site is predominantly timbered with Douglas fir (*Pseudotsuga menziesii*) and quaking aspen (*Populus tremuloides*), with several small dry meadow-like openings. West Fork Mink Creek is formed by numerous springs which emerge about 0.5 mile above the site. Four riparian communities occur along the creek. At least two small stands of ample-leaved sedge (*Carex amplifolia*) are present on seeps that emerge at the base of slopes and on stream terraces above high water. A small stand of Booth's willow/beaked sedge (*Salix boothii*/*Carex utriculata*) occurs on a seepy bench near the upper boundary of the site. The Douglas fir/red-osier dogwood (*Pseudotsuga menziesii*/*Cornus stolonifera*) community occurs along about 0.75 mile of the stream through the upper end of the site and about 0.25 mile of a lower tributary stream. Stream gradients are approximately 10% in the Douglas fir community. Downstream of where two side tributaries enter West Fork Mink Creek, stream gradient lessens and the water birch/mesic forb (*Betula occidentalis*/Mesic forb) community occupies the stream bottom and extends downstream of the site boundary.

Fire

The Lower Portneuf watershed analysis area consists of the area of land that is drained by the Portneuf River and its tributaries. This area includes approximately 62,000 acres of the Scout Mountain block of the Westside Ranger District, Caribou-Targhee National Forest. Portions of this watershed are on private, BLM, State, and Tribal lands.

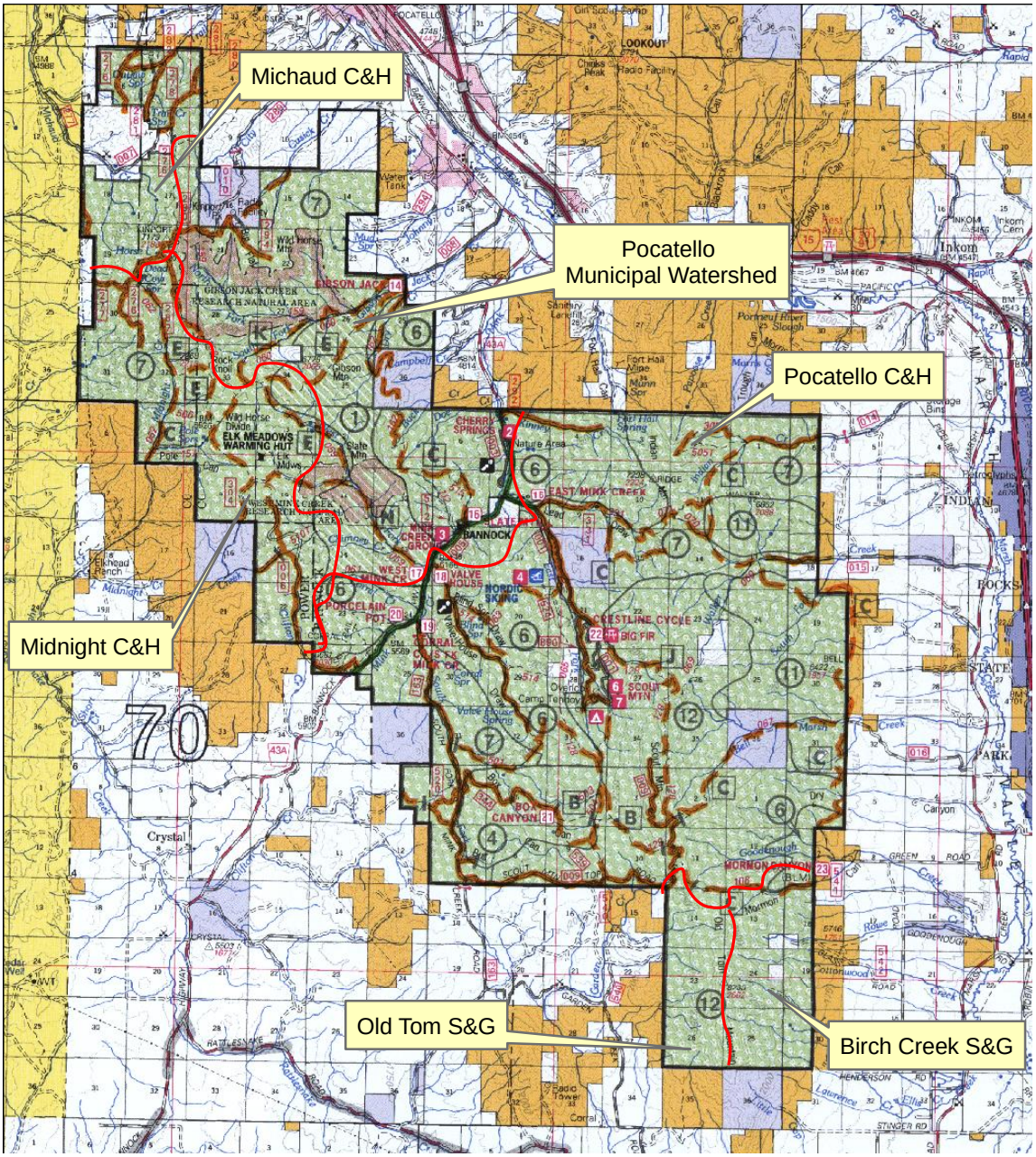
Age class diversity of the vegetation is limited. Most of the forested vegetation is in the mature or older seral stages. Douglas- fir is becoming more predominant as it encroaches on the stands of aspen and shrubs. It is likely that there is more Douglas fir here now, and less aspen, than existed historically. In Barrett's 1994 paper *Fire Regimes on the Caribou National Forest,* Barrett uses three classes to describe vegetation types we have on the forest. For the class that most resembles the forested vegetation type for this watershed analysis he states "However, the average range was 26 to 71 years, and comparatively long fire intervals (e.g. 100-125 years) were uncommon. As of 1994, the years since last fire statistic ranged from 27 to 154 years in the 19 stands. However, the overall mean was 102 years—about twice the length of the presettlement average fire interval" (Barrett 1994). Treatment opportunities have centered on prescribed burns and limited mechanical vegetation treatment where access is more easily obtained. Because stands are scattered and difficult to access, this condition is likely to persist.

Most of the shrub lands are also in late seral stages. Consequently there are potential risks of large fires, insects and disease outbreaks. These risks may be limited by the scattered nature of the stands. Insect attacks in recent years and fire suppression have increased fuel loading to abnormally high concentrations. Prescribed fire and some mechanical vegetation manipulation could be used in the subsections of the analysis area, where access permits, to help restore and maintain a healthy ecosystem.

RANGE

The allotments within the Lower Portneuf Watershed Analysis area were grazed heavily by both sheep and cattle until they came under management by the Forest Service from 1907 until 1937. At this time they were designated as cattle or sheep allotments or both. Figure 12 shows a map with the current allotment boundaries. Refer to Table 11 for the dates and numbers of livestock grazed in each allotment.

Figure 12**:** Allotments within the watershed analysis area



The western portion of the analysis area is comprised of the Michaud and Midnight C&H allotments. This area became part of the Forest at its inception in 1907. Prior to 1986 this area was managed as one allotment. The allotment supported both sheep and cattle until 1945 when sheep were removed. Currently it is managed as two separate cattle allotments.

The southern end of the analysis area is grazed by sheep on the Old Tom/Birch Creek S&G allotment. This area has historically been grazed by sheep prior to and since its inception into the Forest Service in the early 1930's. It was severely overgrazed prior to that time. These allotments are the only portion of the analysis area being grazed by sheep currently.

The Pocatello C&H is the largest allotment and makes up the eastern portion of the analysis area. This area became part of the Forest in 1908. Prior to that time it was grazed by both sheep and cattle. In 1941 sheep grazing was eliminated. In 1952 the allotment was at all time high use level under Forest management, with AUM's numbering 6,216. Today the allotment supports 5,192 AUM's. The main drainages in this allotment are the East Fork and South Forks of Mink Creek, both of which receive a high concentration of recreation activities.

There are four sections of State of Idaho land interspersed within the analysis area. These areas are grazed in conjunction with Forest System lands permitted in the grazing permits. The State lands are held in lease by the current Forest Permit holders and are managed by the Forest Service.

The Pocatello Municipal Watershed was set aside when the Pocatello District was created in 1903, and excluded grazing at that time. It encompasses approximately 13,000 acres.

Table 11: Allotment livestock numbers and dates.

ALLOTMENT	**UNIT**	**Head Months**	**APPROXIMATE GRAZING DATES**	**# OF HEAD**
Michaud C&H		420	July 1 – Sept. 30	177
Midnight C&H	Elk Meadows	692	July 1 – August 10	329
	Midnight		August 11- Sept. 2	329
Pocatello C&H	Indian Creek	5192	June 1 – June 30	249
	Walker Creek		July 1 – August 9	249
	Belle Marsh		August 10 – October 7	249
	Lead Draw		June 1 – July 8	588
	Lower Cow Camp		July 9 – July 23	588
	Upper Cow Camp		July 24 – August 12	588
	Scout Mountain		August 13 – October 6	588
	Highway		June 1 – July 24	362
	Catch		July 25 – August 15	362
	Unit 6		August 16 – October 6	362
			TOTAL C&H	**1617**
Old Tom/ Birch Creek S&G		1400	June 15 – August 15	700
			TOTAL S&G	**700**

FISH

The Lower Portneuf Watershed (HUC 1704020805) and the Garden Creek-Marsh Creek Watershed (HUC 1704020804) are components of the larger Portneuf River Subbasin (HUC 17040208), while the Lower Bannock Creek Watershed (HUC 1704020609) is a small part of the American Falls Subbasin (HUC 17040206). All three watersheds encompass the Bannock Range in southeast Idaho and are part of the Upper Snake River Basin. The Portneuf River (and tributary Marsh Creek) and Bannock Creek are two major systems that empty into the Snake River at American Falls Reservoir. For the fisheries section of the Lower Portneuf Watershed Analysis these watersheds will be addressed together to simply analyze trends and provide recommendations.

Portneuf River Subbasin

The Lower Portneuf River and Garden Creek-Marsh Creek watersheds are located at the bottom end of the 100 mile long, 5th order Portneuf River near the communities of Pocatello, Inkom, and McCammon. The Lower Portneuf subwatersheds in the analysis area include Trail Creek-Portneuf River, Gibson Jack Creek-Portneuf River, Mink Creek, and Indian Creek-Portneuf River. These four subwatersheds encompass tributaries of the Portneuf River including Trail, City, Cusick, Johnny, Gibson Jack, Dry, Campbell, Mink, Buck, Doe, West Fork Mink, Chimney, Corral, South Fork Mink, Box Canyon, Valve House Draw, East Fork Mink, Lead Draw, Kinney, Fort Hall Canyon, Papoose, and Indian creeks. The Garden Creek-Marsh Creek subwatersheds in the analysis area include Bell Marsh Creek-Marsh Creek, Goodenough Creek-Marsh Creek, and Garden Creek. These three subwatersheds encompasses tributaries of Marsh Creek including Walker, South Fork Walker, Bell Marsh, Dry Canyon, Goodenough, Mormon Canyon, Rowe, Cottonwood, Lost, Birch, Ellis, Lawrence, Garden, and Little Gap creeks.

American Falls Subbasin

The Lower Bannock Creek watershed in this analysis includes tributaries of Bannock Creek that flow in a westerly direction from the Bannock Range. Many of these tributaries originate on the Caribou-Targhee National Forest, BLM, and private lands before they enter the Fort Hall Indian Reservation and terminate into Bannock Creek. The Garden Creek-Marsh Creek subwatersheds in the analysis area include Michaud Creek, Eagletail Rock-Bannock Creek, Starlight Creek-Bannock Creek, Lower Rattlesnake Creek and Upper Rattlesnake Creek. These five subwatersheds encompass the tributaries of Bannock Creek including Michaud, Birch, Starlight, Rattlesnake, Midnight, Crystal, and Clifton creeks.

The Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek fish communities consist of native and non-native fish. Native fish include Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), mountain whitefish (*Prosopium williamsoni*), Utah chub (*Gila atraria*), longnose dace (*Rhinichthys cataractae*), speckled dace (*Rhinichthys osculus*), redside shiner (*Richardsonius balteatus*), Utah sucker

(*Catostomus ardens*), mountain sucker (*Catostomus platyrhynchus*), bluehead sucker (*Catostomus discobolus*), mottled sculpin (*Cottus bairdi*), northern leatherside (*Lepidomeda copei*), and Piute sculpin (*Cottus beldingi*). Non-native fish include rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and carp (*Cyprinus carpio*).

These watersheds are within the range of Yellowstone cutthroat trout, a Regional Forester Sensitive Species. There are 12 sub-watersheds located in 3 watersheds within two subbasins associated with the Bannock Range on the Caribou-Targhee National Forest in the analysis area. Of those subwatersheds, 3 are considered Yellowstone cutthroat trout strongholds, 1 has a depressed population of YCT, and 8 are considered historic range, but no YCT were observed there in recent efforts. Non-native fish such as brook trout, brown trout, and rainbow trout have been introduced into the analysis area. In some streams these non-native fish are competing against YCT for aquatic habitat and resources and in other streams stocking of rainbows has lead to genetic mixing with low levels of hybrids present.

Migratory and resident life history patterns of Yellowstone cutthroat trout occur in the analysis area. While resident fish spend their entire lives within a particular length of stream, migratory fish may travel great distances to spawn. Many migratory fish use American Fork Reservoir for at least part of the year, prior to migrating upstream in the lower Portneuf River and lower Bannock Creek to spawn. Prior to straightening and ditching of the Portneuf River through Pocatello, these fish would have likely migrated throughout the Lower Portneuf and Garden Creek-Marsh Creek watersheds and into headwater tributaries to spawn. Currently, channelization of the lower Portneuf River in Pocatello, a combination of high water temperatures, impaired water quality, and reduced hydrology in Marsh Creek and Portneuf River, as well as irrigation diversions downstream of the Forest boundary have contributed to degraded main-stem habitat and decreased connectivity within the analysis area. These anthropogenic impacts have fragmented YCT populations resulting in a decrease of main-stem (fluvial and adfluvial) life-histories and many isolated resident headwater populations.

Historically, leatherside chub, an Idaho Species of Concern and a Regional Forester Sensitive species, also occurred in the Portneuf Subbasin of the Upper Snake River. Museum records indicate that leatherside chub historically occupied Ross Fork Creek, a Portneuf tributary, located below the analysis area and within the Portneuf subbasin. Fisheries investigations over the last decade have failed to locate leatherside chubs or the infamous Pocatello sucker (*Catostomus spp*.) in this drainage (Johnson et al 2004, Keeley 2009).

Urbanization and agricultural use has had its impacts upon the physical characteristics of the Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek and their tributaries. While grazing, road building/maintenance, ranching, logging, and mining have affected streams in the upper watersheds, urbanization, flood control measures, grazing, agriculture and water use affected the Rivers and creeks in the lower watersheds. Land use within the analysis area is diverse and sometimes intense. Land

use practices that have had impacts upon aquatic and riparian biota and habitat within the analysis area include urban development, grazing, mining, road and trail building/maintenance, irrigating, motorized recreation, dispersed camping, and logging. These land uses within the analysis area have affected aquatic and riparian biota and their habitat.

WILDLIFE

Habitats

The Lower Portneuf Watershed Assessment (Watershed) area provides a variety of habitats between 4,400 feet where the Portneuf River enters the American Falls Reservoir to Scout Mountain at 8,700 feet. Land cover types can be broadly classified as urban/industrial, agricultural, rangeland, forested, riparian, and wetland. Key terrestrial habitat types include mountain riparian, mountain brush, sage-steppe, aspen, and mid to high elevation mixed conifer.

Pattern and Processes

The lower elevation areas are dominated by private land with large blocks of BLM land, a few scattered sections of State Lands, and the Fort Hall Indian Reservation on the west side. Most of the higher elevation land is National Forest System lands (Caribou National Forest - CNF) administered by the Caribou-Targhee National Forest, Westside Ranger District. The critical processes that impact terrestrial wildlife and wildlife habitat within the watershed include fire, and a fire return cycle, beaver activity and the associated vegetation and hydrological manipulations, and the annual climatic cycle. Human uses in the watershed that affect wildlife and wildlife habitat include transportation, especially motorized travel, recreation (hiking, mountain biking, hunting, camping), wildlife harvest (through sport hunting and Native American hunting rights guaranteed by treaty), the harvest of trees and other forest products (including grazing), and the spread of noxious weeds.

Species

Species occurrence is based on suitable habitat, human activity, and snow conditions. Many of the species in the area are to one degree or another migratory based on the season. For example mule deer and elk migrate down in elevation to traditional winter ranges. Blue grouse migrate up in elevation to pine stands on ridge tops to winter. Many species of passerines (perching birds/song birds) migrate long distances to the tropical areas of Central and South America to winter and return to this area to breed. Species of management concern within the watershed are listed below.

Federally Listed Endangered, Threatened or Candidate Species

There are no known or suspected occurrences of any endangered, threatened or candidate species within the watershed area. Historically there may have been some use by grizzly bear.

Forest Service Intermountain Region (R-4) Sensitive Species

Known or suspected Sensitive species within the watershed area include American peregrine falcon, bald eagle, flammulated owl, northern goshawk,

trumpeter swan, gray wolf (this species was delisted from its status as Threatened in May 2009, and is now a Region 4 Sensitive species; there are no known packs or individual wolves within the watershed area, but could conceivably inhabit the area), pygmy rabbit, spotted bat and western big-eared bat.

Caribou National Forest Management Indicator Species

The Management Indicator Species (MIS) for the Caribou National Forest include the following: Columbian sharp-tailed grouse – grassland and open canopy sagebrush habitats, greater sage-grouse – sagebrush habitats, and northern goshawk – mature and old forest habitats. All of these species are Region 4 sensitive species and are covered within the sensitive species sections.

Other Species of Interest

Other species of interest include Partners in Flight high priority species by habitat: Hammond's and olive-sided flycatchers, brown creeper (high elevation mixed conifer), ruffed grouse and dusky grouse, sharp-shinned hawk, dusky flycatcher (aspen and mixed conifer), western tanager (riparian & aspen), black-chinned hummingbird and MacGillivray's warbler (mountain brush), calliope hummingbird, broad-tailed hummingbird (riparian). Additional species of interest include: big game (mule deer, elk, and moose), beaver, and amphibians (boreal toad and northern leopard frog).

Laws, Regulations & Management Direction

Laws, regulations, and policy that direct, influence or control management actions that affect wildlife habitat within the watershed include the Endangered Species Act (1973), National Forest Management Act (NFMA), Migratory Bird Treaty Act of 1918 (MBTA), and Executive Order (EO) 13186 on migratory birds, Caribou National Forest Revised Forest Plan (CNF RFP), National Fire Plan, Pocatello Area Land Resource Management Plan (BLM LRMP), and NRCS programs and incentives on private lands. Additionally, there is guidance within the CNF RFP for the management of snags, cavity nesting habitat, down and dead woody material, big game winter range, and animal damage issues.

Areas of Specific Interest

Areas of specific wildlife interest within the watershed include Scout Mountain Nature Trail at the end of the Scout Mountain Road in East Fork Mink Creek and the Cherry Springs Nature Area. Scout Mountain Nature Trail is a Forest Service designated nature trail.

The Cherry Springs Nature Area and the larger Mink Creek area are close to the urban center of Pocatello; located less than ten miles southwest. The area has a series of interpretive nature trails, an information kiosk, restroom and an outdoor amphitheater.

Mink Creek passes through the site, and Kinney Creek comes in from the east. The area contains a thick, healthy riparian zone and provides habitat for many species of migratory birds. Birding opportunities are excellent year-round and it has been recognized on both a National and State basis through the following designations:

1. Idaho Birding Trails #15 by Idaho Department of Fish and Game
2. Important Bird Area (IBA) #41 by the National Audubon Society
3. Idaho Wildlife Viewing Area #62 (These areas are identified by Wildlife Viewing Areas "binocular" road signs.)

Table 12. Terrestrial wildlife species of concern within the watershed assessment area.

Forest Service Region-4 Sensitive Species	Comments
American Peregrine Falcon	
Bald Eagle	
Boreal Owl	Not expected in WA (see text)
Flammulated Owl	
GreatGray Owl	Not expected in WA (see text)
Northern Goshawk	MIS - Forested Habitat Types
Trumpeter Swan	
Columbian Sharp-tailed Grouse	MIS - Grassland/open sagebrush
Greater Sage-grouse	MIS - Sagebrush; not found on USFS land within WA
Three-toed Woodpecker	Potential, but not documented within WA
Grey Wolf	No known packs or individuals within WA
Wolverine	Not expected in WA (see text)
Pygmy Rabbit	
Spotted Bat	
Western Big-eared Bat	
Columbia Spotted Frog	
Additional Species of Interest	
Mule Deer	
Elk	
Moose	
Beaver	

Idaho Partners-in-Flight High Priority Species	Habitat Type
Hammond's Flycatcher	High elevation mixed conifer
Olive-sided Flycatcher	High elevation mixed conifer
Brown Creeper	High elevation mixed conifer
Ruffed Grouse	Aspen & mixed conifer
Dusky Grouse	Aspen & mixed conifer
Sharp-shinned Hawk	Aspen & mixed conifer
Dusky Flycatcher	Aspen & mixed conifer
Western Tanager	Aspen & mountain riparian
Black-chinned Hummingbird	Mountain brush
MacGillivray's Warbler	Mountain brush
Calliope Hummingbird	Riparian
Broad-tailed Hummingbird	Riparian

RECREATION

The analysis area surrounds the community of Pocatello and lies adjacent to the valley communities of Fort Hall, Chubbuck, Inkom, McCammon, Arimo, American Falls, Aberdeen and Rockland. The analysis area serves as the "backyard" to a valley population of approximately 87,000 people (2005 US Census data). Valley residents visit the analysis area on a regular basis for a variety of reasons. Forest users are generally local residents. However, there are some non-resident visitors using the campgrounds and trails. The analysis area would not be characterized as a "destination" spot, such as the Teton Valley or the Yellowstone area. The area does serve as a "gateway" along I-15 to these and other destination spots.

The analysis area hosts a diversity of outdoor recreation uses provided by city, state and federal agencies along with other partners. People visit the area for camping, hiking, mountain biking, Nordic skiing, ATV riding and snowmobile travel. The recreation discussion will not address outdoor recreation opportunities such as organized sports and city park facilities traditionally provided by city and community organizations.

Much of the project area is seen from the City of Pocatello and I-15. Scenic integrity is high, and scenic objectives are to maintain and enhance existing scenic character. Much of the area is roaded, or within one mile of a system road. The area offers a diverse network of motorized and non-motorizes system trails.

The year-round demand for recreation opportunities within the analysis area has created challenges and opportunities for recreation planners, associated partners and resource managers.

CULTURAL RESOURCES

Prior to non-Indian settlement of the west, the members of what are now known as the Shoshone and Bannock Tribes were comprised of many smaller nomadic bands inhabiting a vast area of the American west. Their aboriginal territory includes six states and ranged north into Canada and south to Mexico. Various extended family bands moved across the western landscape hunting, fishing and gathering with the changing seasons.

The Portneuf Watershed analysis continues to be important to the Shoshone-Bannock Tribes of Fort Hall, Idaho. Non-Indian settlement of the area created the need for The Fort Bridger Treaty of 1868 in which the Tribes reserved off-reservation treaty rights on all unoccupied lands (Fort Bridger Treaty, 1868). The original Fort Hall Indian Reservation totaled over 1.8 million acres, much of which falls within the boundaries of this analysis. Due to the expansion of the non-Indian settlers, Congress negotiated with the Tribes to cede much of this land. The current Fort Hall Reservation stands at just above 500,000 acres. Cessation agreements between the Shoshone-Bannock Tribes and the United State Government reserves rights in addition to the rights protected under the Fort Bridger Treaty. Article IV of 1898 cessation agreement reserved the following;

> "So long as any of the lands ceded, granted, and relinquished under this treaty remain part of the public domain, Indians belonging to the above mentioned tribes, and living on the reduced reservation, shall have the right, without any charge therefore, to cut timber for their own use, but not for sale, and to pasture their livestock on said public lands, and to hunt and fish in the streams thereof.

The cessation agreement also has an Article dealing specifically with the water from the streams within the ceded lands. Article VIII states;

> "The water from streams on that portion of the reservation now sold, which is Necessary for irrigation on land actually cultivated and in use shall be reserved for the Indians now using the same, so long as said Indians remain where they now live.

Due to the unique legal and political relationship the United States Government has with Native American Tribes, the Forest Service is guided by manual direction for interaction with Native American Tribal Governments, FSM 1563.01d Treaty Rights. The United States entered in to over 200 treaties with Tribes prior to 1871. Under these treaties, Tribes ceded significant portions of their aboriginal lands to the United States. Each of these treaties in unique but, generally speaking, tribes reserved separate, isolated reservation lands under the treaties and retained certain rights to hunt, fish, graze and gather on lands ceded to the United States. These rights are known as "off-reservation treaty rights."

Approximately 60 of these treaties involve ceded lands that are within the boundaries of present day National Forest System Lands. The Forest Service must administer lands subject to off-reservation treaty rights in a manner that protects Tribes' rights and interests in the resources reserved under treaty. Treaty rights are considered property rights protected by the 5th Amendments Just Compensation Clause.

1563.01d further states;
Treaty rights must be interpreted as the Tribes understood them at the time of treaty signing and ambiguous treaty provisions are to be interpreted in the Tribe's favor. Treaty rights are held by the sovereign Tribes who signed the treaties. Treaty rights can only be extinguished by an express and unequivocal act of Congress. Treaty rights area subject to limited State and Federal regulation, where such regulation is nondiscriminatory and reasonably necessary to the conservation of a species or resource. Tribes may use modern hunting and fishing implements when exercising their treaty rights, and they are not confined to use implements that existed at the time of the treaty signing. This is very important and the Tribes contend that this language, by extension, could be interpreted to mean that they did not have to camp in areas as they existed at the time of treaty signing. This has not been tested in court, but just wanted to let you know the Tribes perspective. Treaty rights include an "easement of access" to the areas on which such treaty rights were reserved.

Further Consideration needed when dealing with Native American Treaty Rights.

The Supreme Court has expressly held that an Indian treaty is "not a grant of rights to the Indians, but a grant of rights from them (*U.S. v. Winans* 198 U.S. 371 (1905). The purpose of an Indian Treaty was not to give rights to the Indians but to remove rights they had. Thus, Indians have many rights in addition to those described in treaties. In fact, any right not expressly extinguished by a treaty or a Federal statute is reserved to the tribe (*Menominee Tribe v. U.S., 391 U.S. 404 (1968); U.S. v. Dion 476 U.S. 734, 739 (1986); Swim v. Bergland, 696 F.2d 712 (9th Cir.1983).* This fundamental principle of Indian law is known as the "reserved rights" doctrine.

Cultural resources are non-renewable resources. As such, Federal regulations have been passed which obligate Federal agencies including the Forest Service to protect and manage cultural resource properties. The Antiquities Act of 1906, the Historic Sites Act of 1935, the NHPA of 1966 with its 1992 and 2002 Amendments, the Archaeological and Historic Preservation Act of 1974, the ARPA of 1979, and the NAGPRA of 1990 exemplify the long and progressive history of regulations concerning the protection of significant archaeological resources.

Archaeological and ethnographic sources indicate the historic and prehistoric utilization of the Portneuf Watershed Analysis Area for camping, hunting, fishing, gathering, grazing, mining, harvesting timber and travelling. Archaeological investigations of known and as yet undiscovered cultural resources may offer insights into the historic and prehistoric land uses and settlement patterns of the area. Cultural resources may be identified as those resources either directly or indirectly related to the material lifeways

of a cultural group, or groups as specified by the Code of Federal Regulations (CFR), 36 CFR 296.3. Cultural resources may refer to sites, areas, buildings, structures, districts, and objects which possess scientific, historic, and social values. The significance of the National Register of Historic Places (NRHP) eligibility of cultural resources is determined by the Forest Archaeologist in consultation with the State Historic Preservation Officer (SHPO).

One of the goals of land managers is to protect and preserve cultural resources within an agency's jurisdiction. In order to fulfill this responsibility, an inventory of these resources is essential. Once site locations are identified, this information can then be provided to planners so that management decisions can be made to avoid or mitigate the effects of proposed project activities. In an effort to identify significant historic and/or archaeological site locations in the Portneuf watershed analysis area, resource specialists utilize survey methods including pedestrian transects and visual assessments of the projected area of potential effects (APE) for all site specific undertakings.

If significant cultural resource properties fall within the area of potential effects or impact area of site specific undertakings, mitigation measures will be recommended in order to achieve a "no adverse effect" determination. All inventory reports are submitted to the SHPO in completion of the NHPA Section 106 process.

PAST CONDITIONS

SOILS AND GEOLOGY

Purpose

To explain how ecological conditions have changed over time as the result of human influences and natural disturbances.

To develop a reference for comparison with current conditions and with key management plan objectives.

Erosion Processes and Soil Resources

The data sources used for this section included:

- Snake River Basin Erosion Report (SRBER, 1979)
- Soil Survey of the Caribou National Forest (USDA FS 1990)
- A View To A River (Leopold, 1994)
- Geologic Map of the Pocatello Quadrangle, Idaho (IDL, 1979)
- A Hierarchical Stratification of Ecosystems on the Caribou National Forest (USDA FS 1997)
- The Effects of Forest Management on Erosion and Soil Productivity. Symposium on Soil Quality and Erosion Interaction, July 7, 1996. Soil and Water Conservation Society of America. Keystone, Colorado. 19 p. (Elliot, W.J., D. Page-Dumroese and P.R. Robichaud. 1996)
- History of Early Livestock Grazing and Some Other Uses in the Area of the Caribou National Forest (Kunz, 1991)
- Early Grazing History of the Caribou National Forest and the Targhee National Forest Eastern Idaho and Wyoming (Valora, 1996)
- Municipal Watershed Management Plan for West Mink and Gibson Jack Creeks of the Pocatello Ranger District Caribou National Forest (USDA FS, 1978)
- Draft Caribou National Forest and Surrounding Area Sub-Regional Assessment, Properly Functioning Condition (Booth et al., 1997)
- Landslide Hazards Related to Land Use Planning in Teton National Forest, Northwest Wyoming (Bailey 1971)

Weathering, stream erosion, mass wasting, and Aeolian depositional periods during the Pleistocene all had a role in shaping the uplands of the Lower Portneuf Watershed. During the Bull Lake glacial period (32,000 y B.P.), lower temperature and increased precipitation increased mass instability resulting in active landslides (Bailey 1971). The low-relief topography has been incised by V-shaped drainages. Much of the geology of the area has potential for natural erosion and mass instability (USDA FS 1990).

Variations in climatic conditions have also contributed to changes in the landscape and geomorphology of the watershed over time. Historically, between 1880 and 1920, the western United States experienced more arid conditions with many heavy, erosive

thunderstorms, and fewer, light, soaking showers. During the past few decades however, the climate in the west had changed, on average, to a cooler year-round climate with more precipitation. It is suggested that the west is trending again toward a more arid climate in the coming decades with more intensive thunderstorms occurring (Leopold 1994).
Localized intense thunderstorms that often occur in the area sometimes result in severe erosion on unprotected soils. Areas disturbed by roads and trails, and timber harvest are vulnerable to erosion in the watershed. Background or natural erosion combined with erosion from man-caused disturbances is the cumulative erosion regime for the Lower Portneuf watershed. Background erosion on these soils is less than 0.25 tons per acre per year (Elliot et al. 1996).

Land use has played an important role in past erosion processes. A study completed for the Upper Snake River Basin identified the amounts of erosion from lands based on the type of use occurring on them. In Bannock County most of the area in the watershed is used as forestland, rangeland or dry land crop production. Although forestland and rangeland management produce much less erosion than other uses, intensive agricultural uses in the county such as dryland and irrigated crop production have substantial effect on erosion processes in the county (USDA 1979). Forested and rangeland areas produce the least amount of erosion on a large scale because of protective cover found on the soils. The report identified intensive thunderstorms as the primary cause of severe erosion on unprotected soils. Table 13 below shows the results of the erosion study for Bannock County.

Table 13: Erosion rate by land use type in Bannock County, Idaho (USDA, 1979).

Land Use	Total Acres (Thousands of acres)	Less than 0.1 t/ac/yr (M acres)	0.1 – 0.5 t/ac/yr (M acres)	0.5 – 1.0 t/ac/yr M acres)	1.0 – 5.0 t/ac/yr (M acres)	5.0 – 10.0 t/ac/yr (M acres)	>10.0 t/ac/yr (M acres)
Irrigated Crops Surface	45.0	10.9			32.0	2.2	
Irrigated Crops Sprinkler	25.0				25.0		
Dry Cropland	143.0				56.0	75.3	11.7
Rangeland	331.0	1.0	330.0				
Forest	154.0	154.0	2.0				
Urban	14.0	11.3	2.7				
Other	6.2	6.0	0.2				
Total	718.2	170.3	345.7	0.0	113.0	77.5	11.7

Before the settlement of European man in the late 1800's to early 1900's, few roads and trails existed in the watershed. Since that time, many trails and roads have been pioneered or constructed near riparian areas and on the uplands that have had an effect on watershed condition and stability in the past. Because roads have the greatest potential to create erosion and sediment, often the watershed condition can be directly related to the density of roads and trails, and their location and maintenance in the watershed. Other

disturbances (i.e. logging, grazing, mining, land development and recreation) also have played an important role in watershed condition and health. Where these kinds of disturbances have removed natural vegetation they have caused accelerated erosion to occur. However, only a few areas of the Lower Portneuf Watershed have been found to have declining soil/watershed conditions.

Disturbances

Wildfires occurred in the past usually during regular return intervals with similar results that occur presently. Wildfires that remove protective cover from the soil surface have contributed to forest and rangeland erosion in the past. Both wildfires and prescribed fires have occurred within the watershed in the recent past. About 1700 acres have burned from wildfires in the past 10 years. No evidence has been found of declining condition due to wildfires or prescribed fires. Roads and trails have taken a minimum of 178.7 acres out of production. In the watershed there have been 181.7 miles of roads and trails constructed. Only a few of these have been closed or obliterated and restored back to productivity. These roads and trails represent approximately 0.28 percent of the acres in the watershed (see Fig. 13). Timber harvest has occurred on 728 acres. Approximately 800 acres of the watershed have been identified as having weed infestation.

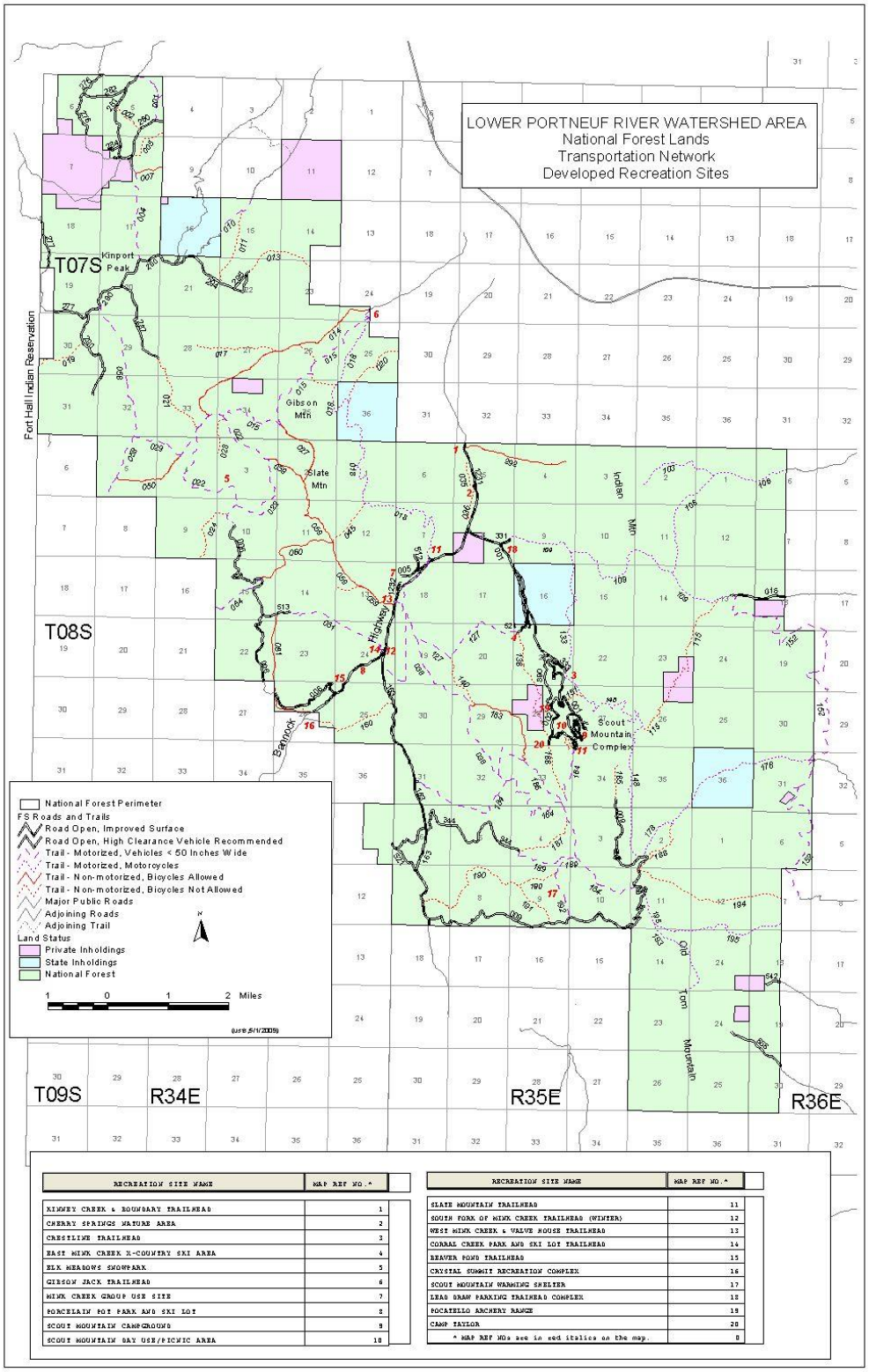


Figure 13: Transportation System of Lower Portneuf Watershed Forest Service Portion.

Historic Conditions – Ground Cover/Riparian Soils

Settlement of the area began in the early 1800's with the construction of Fort Hall by Nathanial Wyeth (Valora 1996). He brought livestock to supply the fort and soon other would bring grazing animals into the Portneuf and Sake River area. Prior to that time, buffalo and other wild animals were the primary grazers of the area. Ground cover within the watershed is assumed to have been adequate to protect the soils from erosion before livestock were introduced into the area in the late 1800's (Kunz 1991). This assumption is made based on the amount of biomass currently consumed by livestock that would be historically left as ground litter. Riparian areas and wetlands also had less impact from trampling and grazing before the introduction of livestock. Once livestock were introduced shortly after the trapping period, historic intensive grazing occurred mostly by cattle and later by sheep grazing (Valora 1996). Historically, few areas were farmed within the watershed boundary except for native hay pastures.

Photo 9: Livestock loafing area in Valvehouse Draw.

Historic Conditions – Mass Stability

Although a portion of the watershed has unstable geologic formations (USDA FS, 1990), few recent landslides are currently evident. None have been mapped in the Forest GIS landslide layer. Most of the past mass movements have occurred in the form of slumps and earthflows. Regional factors that have contributed to landslides in the watershed are:

- Relatively high relief and steep slopes with complex drainage patterns.
- Relatively weak or poorly consolidated rock material at high elevations.
- Loess deposits from the late Pleistocene.
- Block faulting from earthquake activity.
- High moisture content near the surface especially on north aspects.

Areas with these factors have potential for mass movement. Landtype 304 in the southwest portion of the watershed has been identified as being unstable, although few recent landslides have been mapped or recognized.

Geology and Minerals

From a geologic perspective, reference conditions become rather meaningless and will not be discussed in great detail in this report. Some collecting of invertebrate and/or plant fossils has occurred in the watershed. However, since only small disturbances are known to have occurred, a characterization of the insignificant activity cannot be accurately developed.

Past disturbances to NFS lands within the watershed directly attributable to mineral related activities are relatively small and generally no longer noticeable to the casual forest user.

WATER

"A science of land health needs, first of all, a base datum of normality, a picture of how healthy land maintains itself as an organism." -Aldo Leopold (A Sand County Almanac).

Two types of hydrologic reference conditions exist in the analysis area. Many are spatial reference conditions: comparing a reference area with an impacted area (e.g. paired watersheds). There are also temporal references: comparing one area over time to determine trend.

Municipal Watersheds: The two largest reference drainages in the analysis area are the West Fork Mink Creek and Gibson Jack Creek watersheds. These areas are congressionally designated municipal watersheds. Watershed condition is very good and water quality is excellent (USDA FS 2003). Special restrictions apply to management activities in these watersheds. No livestock grazing or new road construction is allowed and timber harvest would be rare. Few roads currently exist and the few existing trails are non-motorized. These watersheds provide reference conditions for many of the hydrologic issues and key questions listed in the previous chapter. Portions of these drainages are also designated as Research Natural Areas.

Livestock Exclosure: In addition to excluding grazing within the municipal watersheds, a livestock grazing exclosure is located on the upper South Fork of Mink Creek. A riparian designated monitoring area (DMA) was established in that exclosure in 2006 (Burton et al. 2008). Table 14 summarizes the data and illustrates the noteworthy 96% stable streambanks and 99% vegetative cover on those streambanks.

Table 14: Data summary for South Fork Mink Creek riparian exclosure 7/31/2006.

	Stable Bank (%)	***Covered Bank (%)***	***Percent saplings & young***	***Percent Mature***	***Percent dead***	***Percent hydric***	***Erosion Resistance***
	96%	99%	55%	45%	0%	72%	6: Moderate
	69	69	15	12	0	72	72
95% conf =	*	*	*	*	*	*	*
Criteria:							
> or =	> or =	> or =	> or =	> or =	< or =	> or =	> or =
	80%	85%	25%	25%	10%	80%	7
Does not meet criteria:							
	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**

	Ecological Status	*Site Wetland Rating*	*Greenline Greenline Width (m)*	*% Woody*	*% Hydric Herb.*
	78	79	0.63	43%	48%
Rating	Late	Good			
n=	78	72	70	72	72
95% conf	*	*	0.26	*	

*** 95% confidence interval not calculated**

Unmanaged Recreation: Walker et al. (2008) evaluated the City Creek watershed (high recreational use) against the Gibson Jack Creek Municipal Watershed. The authors found City Creek had greater sediment load, E. coli and carbon concentrations, decreased organic matter processing, and altered invertebrate taxa compared with the less intensely used Gibson Jack Creek. The authors hypothesized that the heavy recreational use experienced in City Creek watershed may be contributing to the degraded watershed conditions. They also emphasized the need to reconsider management techniques to better protect aquatic resources within the region.

Beaver Activity: Beaver were likely very plentiful historically. The original Fort Hall was very important to the fur trade between 1834 & 1855 as discussed in the following excerpts by E.S. Lohse (1993) from "*Southeastern Idaho Native American Prehistory and History"*:

"In 1834, Nathaniel Wyeth, dissatisfied with his fur trade venture, established Fort Hall to dispose of goods rejected at the 1834 rendezvous.

"The original Fort Hall was located on the south bank of the Snake River above the mouth of the Portneuf."

"Trade at the fort worried Hudson's Bay Company officials enough that brigade leader Thomas McKay established Fort Boise near the mouth of the Boise River in 1836… In 1837, the HBC solved any competition problem by buying Fort Hall. HBC Fort Hall dominated fur traffic in Rocky Mountains for the next twenty years… The Hudson's Bay Company closed Fort Hall with the onset of hostilities in the Yakima country in 1855 that closed Fort Walla Walla and threatened lines of supply to the Snake country."

Watershed Improvement Projects: Many early watershed improvement projects focused on grazing issues. That was the case with the Goodenough Pass and East Fork Mink Creek Projects in the late 1940's.

The Forest began a watershed improvement effort on the Goodenough Pass area in 1947. The project area included both sides of the pass between Goodenough and Garden Creeks. Unsatisfactory watershed conditions were caused by sheep overgrazing in the area. In an effort to reduce downstream flooding damage, sheep were removed, the allotment was converted to cattle grazing, and a small watershed project was completed. The watershed project was relatively small and included contour trenching, diversion ditching, and 700 feet of jack pole fencing. The Forest Supervisor in 1955, John Parker, identified proper grazing management as the key to improving conditions: "This is an important watershed and will need rather intensive management of the use. The problem

as we see it is not one of physical improvements but one of getting the proper [livestock] utilization on the usable areas." See Photo **10** 10 through Photo 13.

Photo 10: "Contour trenches and snow fence. Taken from top of first hill south of the lowest saddle. Looking north. Scout Mt. in background." 1954. (USFS 1954 Report)

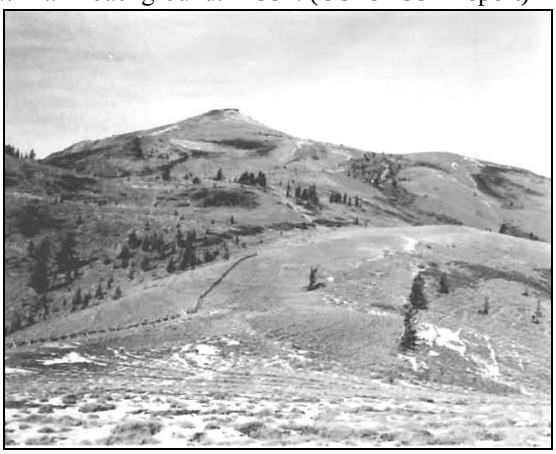


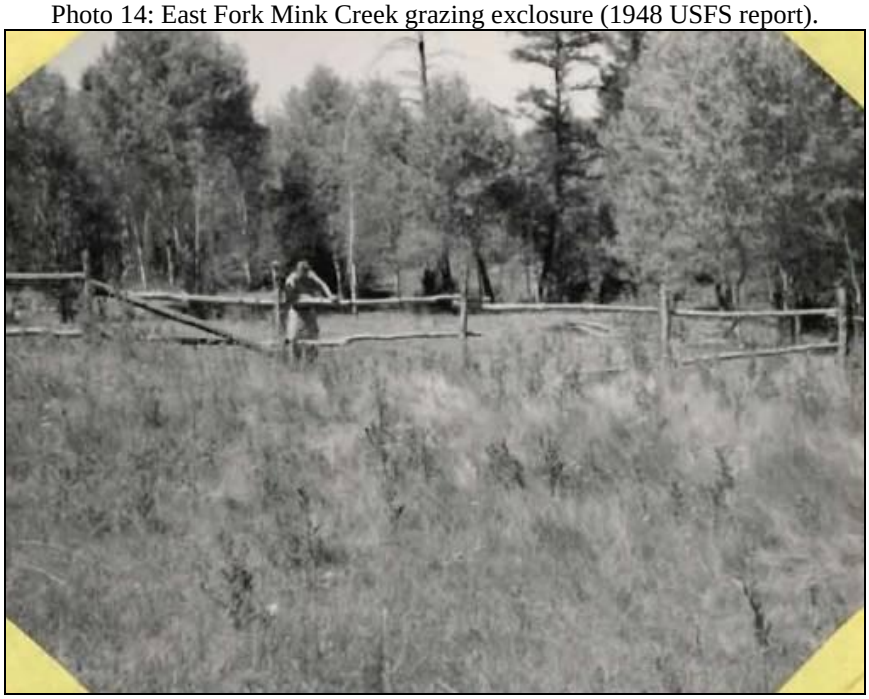
Photo 11: "Gully on Goodenough side near south end of project. Just above large diversion ditch. Looking west. 1949." (USFS 1954 report).

Photo 13: "Head of Garden Creek near Goodenough Pass, August 1947. In 1938 this area was bare ground, sagebrush and a few annual weeds. I remember having to tie my saddle horse up while I ate lunch because there was no grass for him to eat. Now there is good cover of Stypa and other grasses. The recovery is almost unbelievable. This is a double exposure but it gives an idea of the density of grass on the area." (1948 USFS report).

Photo 12: "Head of Goodenough Canyon looking north, August 1947. In 1938 this area showed no grass; now it has a good cover of grass. It is mostly Stypa but that is much better than bare ground." (1948 USFS report).

An exclosure was constructed on East fork Mink Creek in 1938. When this exclosure was constructed this area supported only knott weed and other annuals. Now it is a virtual meadow. A rotation system of grazing was initiated in 1941. Under this system of use, the range has recovered until the area outside of the enclosure has also made remarkable recovery and grass has crowded out the annual weeds" (USFS 1948 report).

Photo 14: East Fork Mink Creek grazing exclosure (1948 USFS report).



VEGETATION

Forested Vegetation

Presently, the forested vegetation in the watershed analysis area is made up of mostly conifer, with some aspen patches scattered in. The majority of the aspen stands are being encroached by conifer. The conifers are predominantly Douglas fir with some subalpine fir. In the paper *Vegetation Dynamics Under Fire Exclusion and Logging In a Rocky Mountain Watershed, 1856-1996,* Alisa L. Gallant and others conducted a study in the Beaver Creek watershed in the Eastern Centennial Mountains in Idaho. In this study they found a trend of decreasing aspen stands and increasing conifer stands. Alisa L. Gallant et al (2003) found "a major shift from the prevalence of aspen-dominated patches in the past to conifer-dominated patches in the present, and a corresponding shift from younger to mature structural classes." They also found "In the mid 1800's, more than one-third of the landscape was projected to have been dominated by aspen, both in pure stands and in mixed stands… Distribution of conifer-dominated forests appears to have increased steadily through time, from ~15% landscape coverage in the mid-1800s to half the landscape now." From field inspections and photos taken during fuels monitoring, remnant stands of aspen were visible within the heavier stands of conifers (Fig. 1 & 2). Tree succession has moved from early/mid succession trees species to mid/late succession species. Conifer stand size also appears to be enlarging over time. However brush and scattered conifers make up the bulk of the vegetation composition of these areas.

Photo 15: An aspen stand in the analysis area in the autumn.

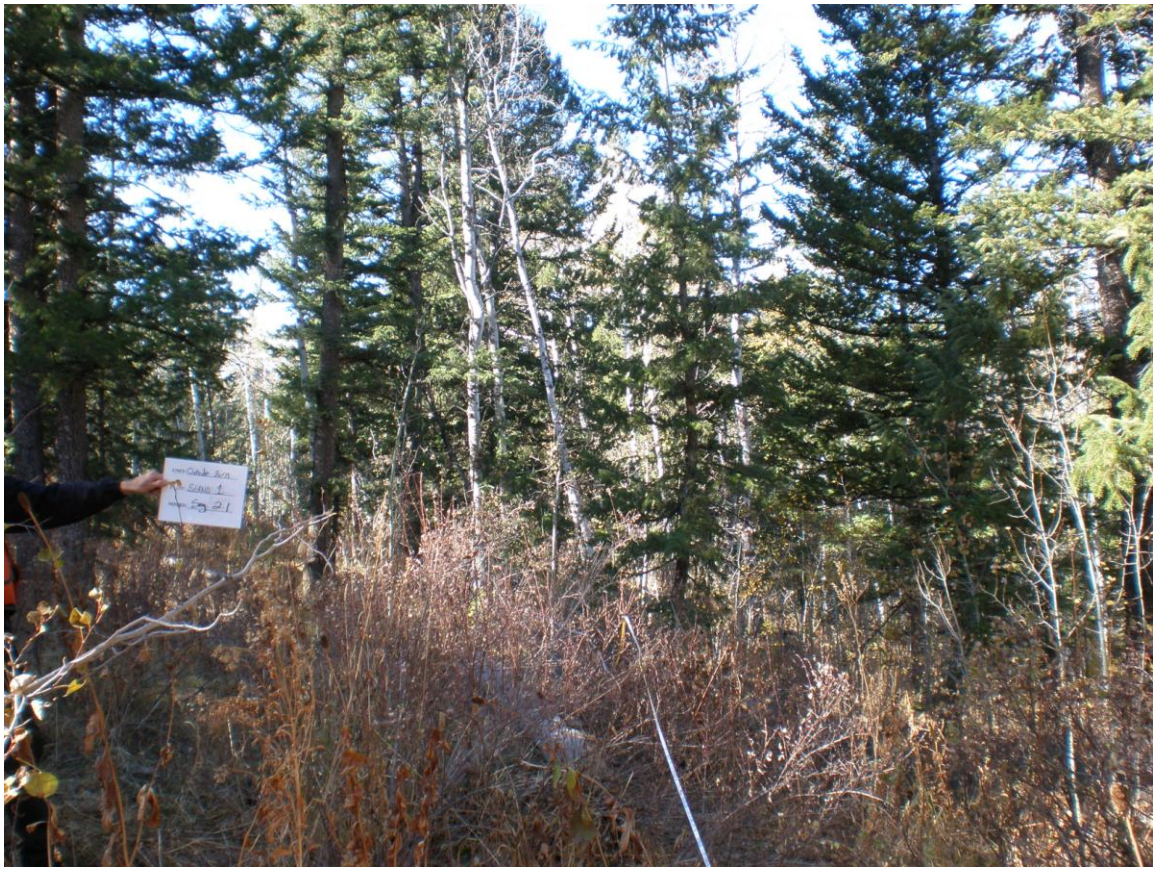


Photo 16: Photo taken in South Fork of Mink Creek in a Douglas-fir stand showing remnants of an aspen stand.

Photo 17: Photo taken in South Fork of Mink Creek in a Douglas-fir stand showing several dead and down aspen trees as well as some still standing.

Research Natural Areas

The Forest Service Research Natural Area network protects some of the finest examples of natural ecosystems for the purposes of scientific study and education and for maintenance of biological diversity. National Forests and Grasslands in eleven western states manage an exceptional suite of 273 established and 71 proposed Research Natural Areas. These areas represent a wide variety of habitats and ecosystems along elevational gradients from alpine to lowlands; and biogeographic gradients ranging from coniferous forests of the Northern Rockies to semiarid deserts of the southwest and prairie ecosystems of the plains. The Gipson Jack Research Natural Area was established in 1982. The West Fork Mink Creek Research Natural Area was established in 1973.

The Gipson Jack RNA consists of 2210 acres located about 6 miles south of Pocatello in the headwaters of Gipson Jack Creek, a tributary of the Portneuf River. This site contains riparian vegetation along the stream, transitioning into shrub and forest communities at higher elevations. It has been protected within the Pocatello City Watershed for more than 75 years. Gibson Jack Creek RNA contains several shrub types in unusually fine condition. These include mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) types, a black sagebrush (*Artemisia nova*) type, a Utah juniper (*Juniperus osteosperma*) type and chokecherry-serviceberry (*Prunus virginiana-Amelanchier utahensis*) communities. The area also contains several forest types, including bigtooth maple (*Acer*

grandidentatum), aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), and subalpine fir (*Abies lasiocarpa*). It includes a small drainage basin complete with streams, beaver dams, and ponds. Red-osier dogwood (*Cornus sericea*) dominates the riparian zone, with willows, including whiplash willow (*Salix lasiandra*), attaining prominence on the lower 0.25 mile. An unclassified forb-dominated community interrupts the red-osier dogwood and continues up the the northerly fork to end of permanent water. The mountainous country provides geologic, elevational, slope, and aspect variation. These result in great differences in vegetation. Forests cover most of the north-facing slopes while shrubs and grass dominate on southern slopes. Boundaries between vegetation communities are sharp and easily distinguished.

The West Fork Mink Creek RNA consists of 640 acres located 7 miles south of Pocatello midway up the West Fork Mink Creek drainage. This RNA is divided into two units with a buffer strip between the two along the old road/trail that heads up the creek. The two units are quite different and the site features a variety of vegetative cover types including Douglas fir (*Pseudotsuga menziesii*) and aspen (*Populus tremuloides*) forests on north-facing slopes and sagebrush-grass types on south-facing slopes. The upper slopes of Slate Mountain have a thin soil mantle with many exposed shale outcrops and support a predominantly black sagebrush-Sandberg's bluegrass (*Artemisia arbuscula* nova-*Poa secunda*) association. About 10% of the upper slopes has a Utah juniper (*Juniperus osteosperma*) tree cover. The lower xeric slopes support the basin big sagebrush/Great Basin wildrye (*Artemisia tridentata* ssp. *tridentata/Elymus cinereus*) association and a variety of shrub species. The western portion of the site is predominantly timbered with Douglas-fir (*Pseudotsuga menziesii*) and quaking aspen (*Populus tremuloides*), with several small dry meadow-like openings. West Fork Mink Creek is formed by numerous springs which emerge about 0.5 mile above the site. Four riparian communities occur along the creek. At least two small stands of ample-leaved sedge (*Carex amplifolia*) are present on seeps that emerge at the base of slopes and on stream terraces above high water. A small stand of Booth's willow/beaked sedge (*Salix boothii*/*Carex utriculata*) occurs on a seepy bench near the upper boundary of the site. The Douglas fir/red-osier dogwood (*Pseudotsuga menziesii*/*Cornus sericea*) community occurs along about 0.75 mile of the stream through the upper end of the site and about 0.25 mile of a lower tributary stream. Stream gradients are approximately 10% in the Douglas fir community. Downstream of where two side tributaries enter West Fork Mink Creek, stream gradient lessens and the water birch/mesic forb (*Betula occidentalis*/Mesic forb) community occupies the stream bottom and extends downstream of the site boundary.

Fire

Historically fire was part of the ecosystem on the Caribou-Targhee National Forest. Reports as early as the 1800's indicate fire occurred throughout the area. W.P. Hunt reported in his diary on September 9, 1811, the valleys had recently been burned by grass fire (Webster, R.L., Caribou History). This was the first record of fire on the Caribou when he mentioned that a recent fire in the country between the Fish Creek divide and present Alexander Gap had destroyed all the horse feed. Historical fire return intervals for this area are in the range of 26-71 years with mixed severity being the predominant fire regime type (Barrett 1994).

The pioneer settlers report that forest fires during the 1870's and as late as 1888, burned uncontrolled all summer long in the Caribou Forest (Webster, R.L., Caribou History).

Past history indicates that the Indian tribes set whole drainages on fire to improve grazing and wildlife habitats. The past history points to severe fires during the past 100 years that almost completely destroyed most of the old fir stands.

Over the last 22 years about 57 wildfires have burned approximately 1700 acres of the Caribou-Targhee National Forest section of the watershed analysis area. According to Barrett (1994), this is only about one one-hundredth of what would have burned under the historical fire regime.

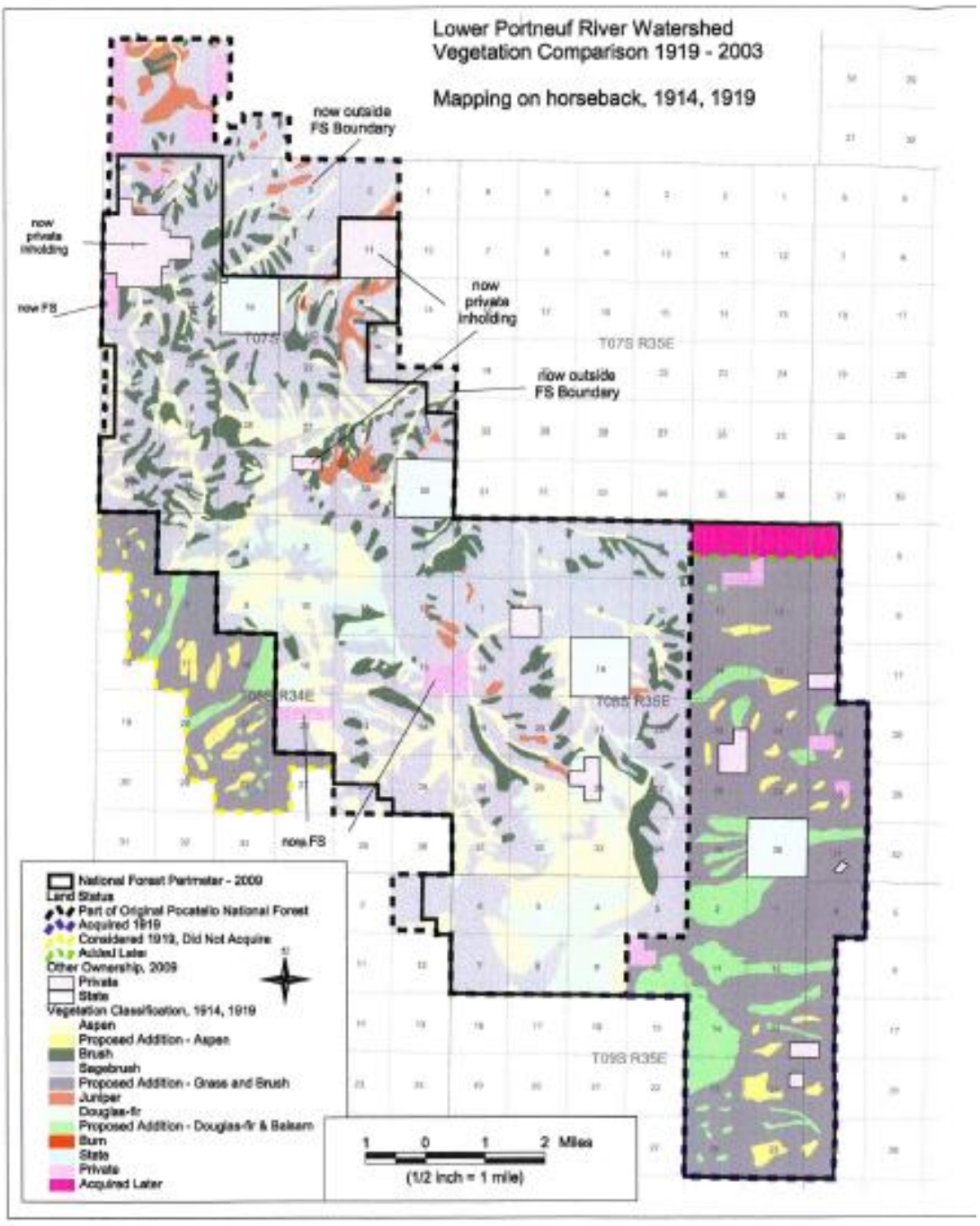


Figure 14: Lower Portneuf Watershed Analysis Area vegetation comparison between 1919 and 2003.

RANGE

Thiel Kunz, in *History of Early Livestock Grazing and Some Other Uses in the Area of the Caribou National Forest* (1991), documented use by livestock well before the creation of the Forest. An anonymous source stated that as early as 1872, 9000 head of cattle were trailed from Texas to Toponce. In 1875 Alexander Toponce ran as many as 10,000 cattle from the Reservation south to Marsh Valley. In 1905, 200,000 sheep were dipped for "scab" east of the Portneuf River near McCammon, while the sheep waiting to be dipped grazed on the mountain to the west. This mountain was referred to as Scab Mountain, now known as Scout Mountain.

The 1958 Grazing Management Plan for the Pocatello C&H stated, the "Pocatello range has been used by domestic livestock ever since white settlers moved into the general area". In 1902 there was an influx of settlers when areas that had been part of the Fort Hall Indian Reservation were opened to settlement.

In an account by Sterling Justice, in his book titled *The Forest Ranger on Horseback* (1967), he states, "After the watersheds of Mink and Gibson Jack Creeks were eliminated from the Fort Hall Indian Reservation, this land had no protection from grazing, and it then became public domain. Both sheep and cattle crowded into it until the watersheds were badly contaminated. It was then that congress was petitioned to create it into a Forest Reserve". This occurred in roughly 1903.

In 1909 the Daniels and Evans Company ran several thousand cattle and 150 head of horses in the Bannock and Crystal Creek Valleys (Justice, 1967). Large numbers of trespass cattle and sheep were a problem on all boundaries of the Forest within the analysis area (Justice, 1967). As many as 150 head of "wild horses" ran on the forest in the 1910-1920's, and had to be rounded up and removed numerous times by the Forest Ranger, Sterling Justice (1967).

Misuse of the Belle Marsh addition of the Pocatello Allotment began in 1900, according to the 1937 Grazing Management Plan. In 1903, a sheep sheering corral was constructed in Indian Creek. This corral was in existence for five years with an average of 60,000 head of sheep sheered there each year. This number was only a fraction of the sheep that traveled through the area, either to pasture in the desert or to the other two sheering corrals to the west and east. The plan states that the range was "severely over-grazed" for miles around the corrals. Between 1908 and 1910, homesteaders began taking up land to the west, eliminating sheep driveways through the area. Sheep trailed through Goodenough Canyon until it too became homesteaded and the driveway was eliminated. During this timeframe there were approximately 3000-4000 head of cattle grazing in this vicinity. Finally in 1932 the Belle Marsh area was added to the Forest. At the time 20 bands of sheep and 2000 head of cattle were grazing the area.

From 1938-1940 all cattle use was eliminated from the Marsh Creek slope due to the condition of the range, and reseeding efforts by the CCC ensued in 1939 and 1940. This

area was combined with the Pocatello allotment in 1941 (Grazing Management Plan 1942).

A large portion of the South Fork of Mink drainage was part of the Reservation and was not grazed by domestic livestock until "comparatively later" (1942 Grazing Management Plan). In approximately 1909, the South Fork of Mink Creek was petitioned and passed to become a part of the Forest under management by the Pocatello District (Justice 1967). Livestock use in the Lead Draw/ Kinney Creek area was heavy, and by 1940 it was denude of all vegetation but annuals in the lower elevations (GMP 1942).

According to the 1962 AMP, local residents filed a petition to have the Birch Creek/ Old Tom area placed under jurisdiction of the Forest Service in 1937. They reasoned "Severe overgrazing practices that were occurring on the west slope of Marsh Creek between Robin and Inkom were causing serious flooding". In 1937 these allotments were added to the Pocatello District.

The Midnight/Michaud allotments became part of the Forest at its inception in 1907. Prior to 1986 this area was managed as one allotment. It was split into the Midnight and Michaud allotments at that time. The allotment supported both sheep and cattle until 1942 when use by cattle became exclusive.

Early Management

Key areas were developed within the allotments to determine range readiness. When plants in the key area reached a certain phenological stage, then the allotment or adjacent area was ready to be grazed. Today, key areas are established as designated monitoring areas to determine overall trend and to monitor annual utilization levels.

Salting grounds were permanently established within allotments and mapped for location and amount of salt to be placed there. Today permitees are encouraged to move salting locations to eliminate continuous high use in an area.

Livestock were permitted to enter the Forest as early as the beginning or middle of April. Today Livestock do not enter allotments (within the analysis area) before then June 1st.

Noxious weeds within the analysis area were not present or were of small enough populations that they were not mentioned in the 1914 or 1919 mapping exercise.

In 1914 and 1919 vegetation classes within the Forest were mapped from horseback. Comparable values from that mapping are shown in table one with vegetation classes mapped in 2003 using satellite landsat capabilities. The values are surprisingly similar despite an 84 year time lapse.

Table 25: 1914, 1919 and 2003 Non-Forested Vegetation Comparison

1914.1919 Cover Class	1914, 1919 Acres	% Cover	2003 Cover Class	2003 Acres	% Cover
Grass Brush + Sagebrush*	36879.1	**86%**	grass/shrub	34956.6	**81%**
Brush	5205	**12%**	mountain brush	6960.6	**16%**
Juniper**	702	**2%**	mountain shrub	1000.2	**2%**
Riparian	Not calculated	**0%**	riparian	177.4	**<1%**

This table was created using GIS data clipped by M.Mousel, 5/15/2009
** 1914, 1919 grass brush and sagebrush values were combined to be comparable to the 2003 grass/shrub vegetation layer.*
*** The 2003 mountain shrub vegetation layer includes both juniper and mahogany. Mahogany was not included in the 1914, 1919 mapping.*

Information gathered from the *Caribou National Forest and Surrounding Areas Sub-Regional Properly Function Condition (PFC)* document, written in 1997 was used to estimate the historic range of variability and PFC indicators or a snapshot of vegetation reference/desired conditions from 150-400 years before present.

Table 16 lists the average PFC value or the desired historic/reference condition for non-forested vegetation types within the Forest.

Table 16: Desired / Reference Condition and Composition by Vegetation Type

VEGETATION TYPE		DESIRED/REFERENCE CONDITION	
		STRUCTURE	COMPOSTION
Riparian		Balance between the vegetation, water, and soil resource	Amount and kind of vegetation sustain the riparian dependent resource.
Grass/Shrub		Balanced range of structural stages. 40% of area with 15% or more crown cover.	Dominant on all but 0-5% of historical habitat. Grasses 45-50% and forbs 20-25% composition (SRM 401 & 402, 1994).
Mountain Brush		Multiple vegetation layers with alternating vertical dominance	Balanced shrub/herbaceous understory
Mountain Shrub	Juniper	40% Mature and old age classes	Forbs, shrubs, & grasses are resilient
	Mahogany	Balanced age class with 35% annual leader growth retained	Herbaceous layer >20% Bare ground <25%

This table was developed using information described in the *Caribou National Forest and Surrounding Areas Sub-Regional Assessment Properly Function Condition* (PFC). Version: May 6, 1997.

FISH

It was difficult to establish a date that clearly defines the separation between past and current conditions. If data existed, good separators could have been when the Portneuf River was channelized or before urbanization and agricultural development began. However, insufficient data exists pre-river modifications or pre-settlement. Somewhat arbitrarily, I established the separation date for the fisheries analysis to be 1990 because there appears to be some amount of data available in the 1970's through the 1980's and then in the 1990's through today. I tried to stay true to that division between past and current conditions for the purpose of clear discussion in this document.

Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek Drainages

The majority of the Caribou history presented here was compiled by Webster (1974) in the History of the Caribou. The first white men to visit the Caribou and the Portneuf were likely stragglers from the W.P Hunt Party in 1811 that stayed behind at Henry's Fort. However there is no documentation of their travels across southeast Idaho during the period of 1811-12. The second group to the area was Robert Stuart and other members of the Hunt Party that were returning from the coast in route to St. Louis. In September of 1812, Stuart was the first to note his camping spots and cross country route along the lower Portneuf, Marsh Creek, Upper Portneuf, Bear River, Thomas Fork, Salt River, and South Fork Snake River and returning to Henry's Fort. Soon after (1818-1821), the first trappers from the Northwest Fur Company led by MacKenzie from the Hunt Party had arrived and began to trap the waters of the southeast Idaho.

In 1819 the Ross Fork was named after Alexander Ross from the Northwest Fur Company led by MacKenzie. Ross eventually led the Hudson Bay Company after it took over the Northwest Fur Company in 1821. By 1824 the word was out about the bounty of fur in the area and several trapping parties led by Jim Bridger, Peter Skene Ogden, and Jedediah Smith were already on the scene and spread out in Caribou County. Ogden noted in May of 1826 that McKay (trapper with Hudson Bay) returned from the Blackfoot, Bear, and Portneuf rivers with 440 beaver pelts. Ogden then collected a total of 2,440 beaver pelts by 1828 and shipped them to Fort Vancouver. It was Ogden that named the Portneuf after one of his trappers that was killed by Native Americans as he traveled along the river looking for McKay's party.

In the period from 1824 to 1845 a parade of fur companies and independent trappers were trapping across southeast Idaho in pursuit of the bountiful and prized beaver pelts. They competed not only for the beaver but for all the other valuable wildlife including mink, buffalo and other valuable furs to the point of depletion. By 1835, when Captain Meriwether Bonneville returned to the Blackfoot to hunt buffalo, he was taken back by the depletion of buffalo and beaver and exclaimed that this country was no longer fit for white men to inhabit. This sentiment was also echoed by Francis Ermatinger, an agent for the Hudson Bay Company at Fort Hall, who reported to the company in 1839 that the

country was ruined with the beaver gone and the buffalo getting scarce. The total beaver catch that year was reported as 3,300 pelts.

Another prominent early use of the forest was grazing. The first extensive use of forage by cattle and horses started in 1836 as settlers trailed over the Oregon and Lander trails. By 1863, cattle were common on the Portneuf, Malad, and Cache valleys with larger outfits entering the area around 1868 and large numbers of cattle present by 1875. In about 1885, sheep became the most common livestock on the Caribou with some locally owned bands and many trailing bands owned by larger conglomerates. John Raphael, former forest supervisor of the Wyoming Forest, stated that when the Palisade, Cache, Teton, and Wyoming forests were created in 1905 this displaced many sheep bands that moved into the Caribou area. For the next two years (1905-1907) these bands joined the bands already grazing this area and totaled nearly a million sheep. The Caribou National Forest in 1907 was at the climax of a 10 year period of overgrazing. This resulted in degraded lands and the Caribou was described as a dust bowl.

Urbanization started with establishment of the Utah Northern Railroad that followed Marsh Creek down the Portneuf River and reached Pocatello in 1878 where the short line had created a junction. Pocatello was established in 1882 by the Oregon Short Line Railroad Company on 40 acres with the Fort Hall Indian Reservation set aside by the Interior Department. The town was originally known as Pocatello Junction.

The original municipal water development in Pocatello was from wells around the Portneuf River and a pipe line from City Creek to the railroad shops. By 1892 a high line ditch was built to deliver water to the city from Mink Creek. Evidence of this old ditch is still present on the West side of the Mink Creek canyon.

In 1966 pollution of the Portneuf River and Marsh Creek was a concern for state regulators and residents of the river communities. So much so that a front page series in the Idaho State Journal (Bacon 1966) was written about the pollution, its impacts, and what was being done to reverse the trends. The articles documents that agricultural runoff from farmers fields was depositing silt into the river, raw untreated sewage from the communities of Lava, McCammon, Inkom, and Pocatello were polluting the river, and industrial wastes from Simplot fertilizer plant and the Rowland Brothers Dairy were all contributing to the degradation of the river. The article notes that below Inkom, fish were scarce in the river and if they were caught they were likely to be contaminated and inedible. Up until 1959 when the city built a treatment plant, all of Pocatello's sewage was discharged in to the river. Also in 1966 the Simplot plant built settling ponds to capture plant wastes. Even with these improvements it was reported that during the summer of 1965 American Falls Reservoir suffered from an algae bloom that filled the water column and dropped water visibility down to zero.

In 1968, the U.S. Army Corps of Engineers completed construction of a 1.5 mile long vertical walled concrete channel through Pocatello to contain the Portneuf River and reduce flooding. This project reduced the overall river length by 4.1 miles and eliminated 144 acres of riparian habitat. This project also eliminated passage for fish in the lower

Portneuf River and American Falls Reservoir that migrate upstream to spawn (IDEQ 1999). The concrete channel starts near the City Creek confluence. Upstream of this location the Portneuf River is confined by a rip-rap lined channel.

By 1968 the upper Portneuf River (upstream of the analysis area) was considered a blue Ribbon trout fishery supported by both hatchery and wild rainbow trout. At this same period Mohr released his thesis on the Portneuf fishery and found that brown, rainbow, and brook trout had been introduced and were thriving in the watershed (IDEQ 1999).

In 1978 the BLM conducted a habitat condition rating of fishery streams on BLM lands within the Garden Creek-Marsh Creek watershed. These results were contained in the TMDL Assessment (IDEQ 1999) and showed that throughout the watershed 51% of the fish habitat was in poor to fair condition. Within the analysis area, Bell Marsh, Birch, Garden, Goodenough, Midnight, Moonlight, Mormon Canyon, and Walker creeks were inventoried and contained mostly fair to good conditions (91%) and some excellent areas (9%).

Although fish stocking likely occurred earlier, IDFG fish stocking records go back no earlier than 1967 (IDFG 2009). Records from this database show that rivers and streams within the analysis area were stocked with mostly non-native trout and sometimes various strains of native cutthroat trout. At about the same time, regional fisheries biologists were conducting fish sampling within these same drainages to assess fish plantings and get better estimates of trout densities and composition. In 2006, IDFG developed a spreadsheet that described the fish communities in all the tributaries of the South East Region. This spreadsheet details all fish sampling and creel surveys conducted from the 1950's to 1995. Many of the Portneuf tributaries were spot sampled starting in the early 1970's by IDFG Regional Fishery Manager, John T. Heimer. Accounts from fish stocking and fish sampling records are compiled below.

Portneuf River

The Portneuf River has been periodically stocked in the past and is still supplemented today with triploid rainbow trout, genetically manipulated fish that are not expected to reproduce significantly. From 1968 to 2009, the river was stocked with various types of rainbow and brown trout. Triploid rainbows were planted starting in 2000. Only a couple of records indicate that cutthroat trout and blue catfish were also stocked. These records cover stocking on the entire river and are only available dating back to 1967. Previous to 1967, fish stocking was not stringently documented (IDFG 2009). In 1965 Casey with IDFG sampled the lower Portneuf River and captured 5 rainbow and 19 brown trout. In 1978, J. Heimer sampled the lower Portneuf River and captured 5 rainbow and 5 brown trout. In 1986 J. Heimer sampled the lower Portneuf River and captured 1 rainbow, 2 cutthroat, and 2 brown trout (IDFG 2006).

In 1967-1971 Minshall and Andrews (1973) from ISU studied seasonal trends in macroinvertebrates, discharge, and water chemistry and temperature within the Portneuf River. The study encompassed 10 sites throughout the lower and upper Portneuf River.

Overall the study found that the Portneuf River has suffered many anthropogenic impacts resulting in alterations of water quality and marcoinvertebrate distribution. Most notably the study citied irrigation practices, agricultural runoff, and water pollution (industrial, urban, and sewage) as impacting the river. Of particular note was water quality changes associated with waste water discharge from the phosphate processing plant. At this site, phosphate and fluoride levels spiked in the river. However the authors noted that these changes were not significant enough to account for the recorded decrease in marcoinvertebrate densities and diversity. It was suggested that at this location, another undetected waste may be contributing to the changes in macroinvertebrates as well as to past unexplained and large fish kills.

A comprehensive study of the Portneuf River fishery was conducted by the Department of Fish and Game in 1979-1982 (Heimer 1980 and Heimer 1983). Most of the fisheries studies involved looking at angler effort and harvest, a study on catch rates of stocked fish with and without pectoral fins, and fish population inventories in the upper Portneuf. However two fish sampling sites on the lower Portneuf were established for repeat monitoring. These results are discussed below.

In mid September of 1979 IDFG personnel electro-fished the section of the lower Portneuf located downstream of the Interstate 86 bridge. During the inventory they captured, marked and released 162 rainbow, 3 albino rainbow, and 3 brown trout. On the very next day they re-sampled the same section of river and captured 162 rainbow, 4 albino rainbow, 3 browns, and 2 cutthroat trout. A fish population estimate wasn't calculated for this reach. The trout composition of this reach was 96% rainbow, 2% albino rainbow, 1% browns, and less than 1% cutthroat trout. Only two of the rainbow trout were marked and recaptured from the previous day. It was noted that all fish captured lacked any identifiable hatchery marks and that the mean total length of the rainbow was small at 175mm. J. Heimer noted that it was unusual that so many smaller rainbows were captured and suggested that they might be escapees from commercial hatcheries in the area.

An additional mark recapture site on the Portneuf River located between Inkom and McCammon was sampled in 1979-1982. In each of the mark recapture surveys, brown trout, rainbow trout and cutthroat trout were captured with brown trout as the dominant trout species found. Very low numbers of rainbow and cutthroat trout were sampled each year. The estimated mean trout population in this reach was calculated at 224 trout for the period of 1979-1981 and 283 trout in 1982. It was noted that the brown trout were doing well in his reach even with seasonal irrigation withdrawals. Regional Fishery Manager J. Heimer recommended that brown trout stocking should be discontinued in this reach on the account that numbers were high and that most of the fish were of natural origin and not from a hatchery (Heimer 1979).

In 1987 Bio West consultants L. Crist and P. Holden (1988) conducted fish and habitat surveys for the Shoshone-Bannock Indian Tribes on ceded lands within the Caribou National Forest. Survey results found that Portneuf River tributaries including upper Mink Creek, West Fork Mink Creek, South Fork Mink Creek, and Gibson Jack Creek

contained 100% cutthroat in moderate numbers. In contrast lower Mink Creek was mostly brown trout (77%) with some cutthroat (20%) and hybrids (3%) and the East Fork Mink Creek was mostly cutthroat (88%) but contained low levels of hybridization (12%) and invasion by brook trout (<1%). During the survey, Indian Creek was found to be dry. Habitat notes from the inventory stated that riparian conditions were great and stream stability was high in protected municipal watersheds including Gibson Jack and the West Fork Mink creeks. In contrast, it was noted that portions of upper Mink, East Fork, and South Fork have been extensively grazed and show major impacts to the riparian areas and very low stream bank stability as a result of livestock trampling. It was noted that in some of these drainages that trout were concentrated only in beaver ponds and that these ponds were the sole intact habitat that supported these trout populations. It was also found that many beaver ponds located in the South Fork Mink were absent of fish. It was speculated that high nutrient inputs resulting in heavy macrophyte growth may be contributing to low dissolved oxygen levels at these locations.

Within tributaries of Marsh Creek, cutthroat were the dominant trout species encountered. Walker, Goodenough, Mormon Canyon, and Birch creeks all contained only Yellowstone cutthroat trout. In contrast, Bell Marsh Creek had 99% YCT and 1% brown trout. Bell, Dry Canyon, Rowe, Cottonwood, Lost, and Little Gap creeks were found to be dry during the survey. Habitat notes from the inventory stated that tributaries of Marsh Creek were small with limited pool habitat. Grazing pressure in these drainages was also variable ranging from low in Bell Marsh Creek to high in Walker Creek. Riparian condition and stream stability also correlated with grazing and was found in favorable condition in Bell Marsh and highly impacted in Walker Creek.

Pocatello Creek Pond

Pocatello Creek Pond was stocked with catchable rainbow trout in 1995 and triploids in 2004 (IDFG 2009).

City Creek

City Creek was sampled in July of 1975 by IDFG Regional Fisheries Manager J. Heimer, who recorded capturing 5 cutthroat trout in select pools 1 mile above the oiled road (IDFG 2006). In late July of 1978, J. Heimer investigated an incident where a construction company diverted City Creek resulting in fish deaths downstream. At the scene IDFG personnel electro-fished a 100m section of stream above the diversion and captured 11 cutthroat trout. From this sampling, they estimated that over 230 cutthroat trout were lost as a result of the diversion (Heimer 1979).

Gibson Jack Creek

Gibson Jack Creek was stocked with cutthroat trout fry in 1972 and 1979 (IDFG 2009). A creel survey was conducted in May of 1987 with J. Heimer recording that 63 cutthroat trout were captured within 24 hours. In July of 1975 J. Heimer recorded capturing 8 cutthroat trout and 2 sculpin in an 80 yard stream section located upstream of the city

water diversion (IDFG 2006). This stream was named in 1861 for a Native American called Gibson Jack, raised by Jack Gibson who helped build Meeks ferry on the Snake River in 1860 (Webster 1974).

Mink Creek

Mink Creek has been periodically stocked in the past 1968-2006 with various strains of catchable rainbow trout. Triploid rainbow trout were the most common type planted, starting in 2000. Only one stocking of Henry's Lake cutthroat trout fingerlings in 1989 was documented. Electronic stocking records are only available dating back to 1967. Previous fish stocking was not stringently documented (IDFG 2009). Mink Creek was sampled at the Forest boundary in July of 1975 by J. Heimer who recorded capturing 8 hatchery rainbow trout and 2 sculpin (IDFG 2006).

East Fork Mink Creek

The East Fork Mink Creek was sampled in July of 1975 by J. Heimer who recorded capturing 13 cutthroat trout, 8 brook trout and 4 sculpin in a 110 yard stream section located above the cattle guard. In September of 1980, staff from ISU sampled the East Fork and recorded capturing 96 cutthroat trout and 9 brook trout (IDFG 2006).

West Fork Mink Creek

West Fork Mink Creek was stocked with brook trout fingerlings in 1968, catchable rainbows in 1970, and cutthroat trout fry in 1979. It is suspected that the 1968 brook trout stocking record pertains to the East Fork and is incorrectly classified as a stocking record for the West Fork of Mink Creek. No electronic stocking record was found for the East Fork Mink (IDFG 2009). In 1975 J. Heimer sampled the West Fork Mink Creek just above Bannock Highway and collected 5 cutthroat trout in select pools (IDFG 2006).

South Fork Mink Creek

In 1975 two units on South Fork Mink Creek were sampled by Regional Fisheries Manager J. Heimer. The first unit was a 120 yard sampling section located just above the first road crossing and yielded a sample of 32 cutthroat trout and 5 sculpin. The upper sampling unit was located just below the fourth road crossing (below the Box Canyon confluence) and didn't yield any fish (IDFG 2006).

Marsh Creek

Marsh Creek has been periodically stocked in the past. From 1994-1998, the stream was heavily stocked (76,255) with brown trout fingerlings and fry. From 1997-2008 various strains of catchable rainbow trout were planted. Triploids were the most common type planted after 2000 (IDFG 2009).

Walker Creek

In 1975 J. Heimer sampled a 100 yard section of Walker Creek located 0.6 miles up Walker Creek road from the Marsh Creek Road and captured 18 cutthroat trout (IDFG 2006).

Bell Marsh Creek

Bell Marsh Creek was sampled in early September of 1975. The sampling site was 117 yards long and located near a stream crossing 2.3 miles up Bell Marsh Creek Rd. J. Heimer recorded capturing 15 cutthroat trout (IDFG 2006).

Goodenough Creek

Goodenough Creek was sampled in September of 1975 with J. Heimer capturing 26 cutthroat trout in a 173 yard stream section located 2 miles upstream from the Marsh Creek Road (IDFG 2006). This stream was named after John Goodenough who settled ceded lands along the bench near the stream in 1903 (Webster 1974).

Birch Creek

Birch Creek was stocked with fine spotted cutthroat trout fry in 1984 (IDFG 2009).

Garden Creek

Garden Creek was stocked with catchable rainbow trout in 1971 and brook trout fry in 1972 (IDFG 2009). Garden Creek was sampled in September of 1975 above the second road crossing located past the Garden Gap with J. Heimer capturing 69 cutthroat trout, 1 brook trout, and 70 sculpin in a 100 yard stream section (IDFG 2006).

Clifton Creek

Clifton Creek was stocked with fine spotted cutthroat trout fry in 1984 (IDFG 2009).

Michaud Creek

This stream was named after Michaud LeClaire, a carrier for the Hudson Bay Company at Fort Hall (Webster 1974).

WILDLIFE

Species

For many wildlife species pre-settlement presence/absence and population information within the watershed is unknown. Other than trapper and settler's journals which discuss game species and a few other species of interest, there is little information about wildlife within the assessment area. A description of the required habitat for specific species is used as the desired habitat conditions.

American peregrine falcon (*Falco peregrines anatum*): Significant population declines of the peregrine falcon occurred with the widespread use of the pesticide DDT after WWII. The insecticide, which was touted as a medical breakthrough for the control of insects and the resulting decline in malaria and typhus had a dramatic impact on the peregrine. DDT was shown to biomagnify through the food-chain and reached levels high enough in birds of prey, especially the peregrine falcon that it affected metabolic processes. DDT would convert to DDE and accumulate in body fat. It would inhibit the calcium transfer in the shell gland and would cause a thinning of egg shells, which were not viable. This caused a dramatic crash in peregrine falcon populations. DDT was widely used from the 1940's though the 1960's and even 1970's in the US. In 1972 the use of DDT in the US was banned and later the use of DDT was banned worldwide under the Stockholm Convention. With initial propagation help through falconers and the Peregrine Fund, a non-profit conservation organization, peregrine falcon populations have responded well to the absence of DDT in the environment and have made a dramatic comeback throughout the Continental US. In 1999 the peregrine falcon was removed from the Federal Endangered Species list.

Bald eagle (*Haliaeetus leucocephalus*): The first major decline in the bald eagle population probably began in the mid to late 1800's due to shooting for feathers and trophies, and poisoning. Later, the use of dichloro-diphenyl-trichloroethane (DDT) and other organochlorine compounds had the most dramatic impact on eagle populations through bioaccumulation of the substances in the food-chain and the biochemical interaction with calcium which caused the thinning of egg shells. In 1972 the use of DDT was banned in the US and bald eagle populations positively responded. In 2007 the bald eagle was removed from the Federal threatened species list.

Boreal owl (*Aegolius funereus*): Pre-settlement presence is unknown but probably fluctuates with prey populations and the amount of snags with cavities in mature forests at higher elevations.

Flammulated owl (*Otus flammeolus*): Population levels in the past are not known but may follow the fluctuations of prey populations and snags in mature aspen or Douglas fir.

Great gray owl (*Strix nebulosa*): Pre-settlement presence is unknown. It is expected that their populations coincide with prey populations and mature stands of lodgepole pine with broken tops nest to small openings.

Northern goshawk (*Accipiter gentilis*): Pre-settlement population levels are unknown. It is expected that their populations coincided with populations of ruffed grouse, snowshoe hare, red squirrel, and other prey species populations and mature stands of aspen and conifer.

Trumpeter swan (*Cygnus buccinator*): "Once abundant and widespread throughout much of North America, trumpeter swans were nearly extinct by 1900. Both their numbers and their distribution were severely reduced by subsistence hunting, the commercial plumage trade, and habitat changes. The only trumpeters that survived were those that lived year-round in remote areas or whose traditional migration patterns avoided areas of human settlement" (USFWS 2009c). The population now consists of 19 restored subpopulations located in eight states and three Canadian provinces (Johnson 2007). American Falls Reservoir is one of several breeding areas in Idaho outside of Fremont County that are a result of transplants (Groves et. al 1997, 52).

Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*): Population levels were higher and suitable habitat was more abundant in the pre-settlement period, though precise population levels are not known.

Greater sage-grouse (*Centrocercus urophasianus*): Pre-settlement population levels are not known, but from descriptions from travelers' journals there were higher than they are today. Sage-grouse are still relatively common in the core of their range, but the range has contracted significantly. Threats include habitat fragmentation and degradation of sagebrush habitat (NatureServe 2004).

Three-toed woodpecker (*Picoides tridactylus*): Pre-settlement presence and populations are unknown, however, three-toed woodpecker presence and populations fluctuate dramatically with tree mortality and wood-boring insect populations.

Gray wolf (*Canis lupus*): Wolves occurred historically in the northern Rocky Mountains, including mountainous portions of Wyoming, Montana, and Idaho. The drastic reduction in the distribution and abundance of this species in North America was directly related to human activities, particularly extensive predator control efforts by private, State, and Federal agencies. The natural history of wolves and their ecological role was poorly understood during the period of their eradication in the conterminous United States. As with other large predators, wolves were considered a nuisance and threat to humans (USDI 1994).

Wolverine (*Gulo gulo*): Wolverines were extirpated from the lower 48 by about 1920. Although some recovery has occurred, it may have happened during a window of opportunity between historic causes of extirpation (unregulated fur-trapping, broadcast of poison baits for predators) and new threats to their reproductive and survival rates in

Greater Yellowstone (dramatic increases in human population densities, habitat loss and fragmentation, increasing road densities, traffic volumes, and levels of snowmobile recreation in the backcountry) (WSC 2007).

Pygmy rabbit **(***Brachylagus idahoensis*): It is assumed that populations of pygmy rabbits were more abundant prior to European settlement where the occurrence of big basin sagebrush was more extensive. Much of this habitat that has the deep productive soils has been replaced by agriculture and urban development.

Spotted bat (*Euderma maculatum*) and Townsend's big-eared bat (*Corynorhinus townsendii*): Historical abundance or distribution of these species is not known.

Amphibians: Pre-settlement populations of Columbia spotted frog (*Rana luteiuentris*), Western boreal toad (*Bufo boreas*) and Northern leopard frog (*Rana pipiens*) are not known. Based on expert opinion, amphibian populations world-wide have responded negatively to environmental contaminants. It is assumed that habitat for these species would have been found in ponds, lakes, reservoirs, and slow-moving rivers and streams including beaver ponds in the watershed area.

Big Game (elk & mule deer) & Winter Range: According to the Pocatello Deer-Elk Herd Management Plan (IDFG 1945), in the early 1900s, elk were not found in the area and "deer were a rarity." In 1916-1917, 35 elk were transported by train from Gardiner, Montana, and released west of Pocatello. Counts in the 1930s and 1940s found 500-600 elk. By 1950, elk were reported to be spreading into the Elkhorn Mountain and John Evans Canyon areas (Unit 73), Blackrock (Unit 71), and Crystal and Midnight creeks (Unit 70). In a 1940 report, Ted Trueblood said, "Elk (in this area) are a liability and a problem; deer would be an asset." Elk hunts were first offered in the zone in 1933. Elk numbers declined in the 1950s due to "over-hunting by whites and Indians," and seasons were closed. Permit hunts were offered in some units between 1962 and 1968. Populations remained at very low levels into the late 1980s. Since that time, elk have expanded dramatically in all but Unit 73A. By the mid-1990s, all units except 73A offered some elk hunting opportunity.

The mule deer population in Analysis Area 20 has fluctuated widely since the mid-1800s. Deer numbers probably declined through the early 1900s, possibly due to unregulated harvest. By 1920, observations of deer were quite rare. Between 1920 and the early 1970s, deer numbers increased dramatically, interrupted briefly by significant winter mortality. Following a significant decline in numbers beginning in 1972, numbers again increased until the late 1980s. The population level attained during this second peak probably did not reach that attained during the 1950s to early 1970s. Overall, mule deer numbers in these units appear to be highly volatile with wide fluctuations over relatively short time periods.

Harvest management during the 1950s and 1960s was designed to maintain or reduce deer numbers in response to what was considered over-browsed winter ranges. Season frameworks in these units have varied considerably more than elsewhere in southeastern

Idaho. General seasons have been the rule, except in Unit 56, which had controlled hunts from 1970-1981. Season lengths have varied from 3 days to 5 weeks. Either-sex opportunity has ranged from none to extra antlerless-only tags available in 1989 and 1990 for Units 70, 73, and 73A. Following the winter of 1992-1993, when significant winter mortality occurred, harvest management has been conservative.
Research in the mid-1980s found very low survival of bucks in Unit 73. A 2-point only regulation, with short periods of any buck hunting, was enacted there in 1997 after the buck:doe ratio fell below 10:100. Hunter numbers decreased for several years, proportions of older bucks increased somewhat, until harvest of older bucks returned to earlier levels. In 2004, a 4-point or greater regulation was enacted in Units 70 and 73 in response to public suggestions. The 4-point or greater regulation is still in place for both units which now have a buck:doe ratio of 30:100. The regulation will remain for a few more years to properly monitor its effects and public support (IDFG 2008).

Beaver (*Castor canadensis*) and Beaver Ecology: Early exploration of western North America was largely due to the search for beavers by trappers. Size estimates of the pre-European beaver population in North America were 60-400 million animals or the equivalent of 10-60 animals per mile of stream and river. The Portneuf River and its drainages were traveled and trapped by some of the earliest mountain men in the West. It was likely that beaver and other fur-bearers like mink existed in all of the drainages with perennial water sources. Numerous historical journals document beaver in the area. Prior to the extensive Nineteenth Century trapping efforts, beaver were likely cyclic within the sub-watersheds as environmental conditions changed through beaver herbivory on woody vegetation adjacent to the creeks and fire events and aspen response. Nineteenth Century trapping nearly eliminated the beaver population and the subsequent quantity and quality of riparian habitat declined. Data specific to the watershed are not available, but populations are assumed to have been higher than what they currently are.

Avifauna: Birds were historically impacted by commercial feather harvest and the loss or modification of habitats, and environmental contaminates, namely in the form of pesticides. Following the Lacey Act and the Weeks-McLean Law, the Migratory Bird Treaty Act (MBTA) was established to put an end to the commercial trade in birds and their feathers that, by the early years of the 20th century, had heavily impacted populations of many native bird species. The MBTA protected all migratory birds and their parts (including eggs, nests, and feathers). The MBTA is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to both countries (i.e., they occur in both countries at some point during their annual life cycle). Executive Order 13186 instructs Federal Land agencies on their responsibilities to further implement the MBTA.

Recreation and Transportation – (Impacts to wildlife)

With the invention and spread of the automobile, roads and subsequent recreation on the forest increased. However, in the past due to the limited amount of free time and

resources and difficulty of travel, motorized recreation within the watershed was a tiny fraction of what it is today. Over the past forty years, starting with the advent of jeeps, then four-wheel drive recreational vehicles and later the trail motorcycle, the three-wheeler then four-wheeler All Terrain Vehicles (ATV), motorized recreational use of the watershed has increased exponentially. The impact from off-road ATV use is of concern within the watershed, as it causes the greatest resource damage of other motorized uses.

Range Resources

The Caribou National Forest, including the watershed analysis area has been grazed by domestic livestock since the 1830's. Several of the routes of the Oregon Trail that went through the general area and the presence of Fort Hall, brought cattle and horses. By 1875 there were large numbers of cattle outfits and around 1883 the first sheep were brought to the area (Webster 1972 – 74). It is likely that the heavy cattle grazing from the late 1800's through the 1950' s and 60's impacted the grasses and favored woody browse, which in turn benefitted mule deer, which caused their populations to soar from the 1940's through the 1960's. During this time measures were taken to reduce mule deer numbers through doe harvest. Cattle numbers have been significantly reduced. However, sheep numbers have seen the most drastic reductions from the turn of the century to now. Elk numbers within the watershed area have fluctuated. At one point, elk were reintroduced to the watershed by the Idaho Fish and Game Commission.

Fire Ecology & Loss of Aspen

Throughout the Intermountain West, aspen habitats have frequently been converted to conifer. Estimates for aspen losses range from 60 to 96% from pre-settlement times until today (Bartos 2001). This decline in aspen is consistent for the watershed assessment area. Aspen, especially when it is in association with riparian habitat is the single most species-rich habitat in the west. It is utilized by many species of perching birds, grouse, woodpecker, owl, elk and mule deer.

Prior to the 1880's, fires (both large and small scale) burned through aspen on a regular basis, which kept the conifers down and stimulated aspen suckering (DeByle et al. 1985). Researchers have listed a number of causes for the decline of aspen in the West, including Holocene climatic drying of the region, fire suppression, and ungulate grazing (Sexton et al. 2006, DeByle et al. 1985, Shepperd et al. 2001). Fire is the critical disturbance component needed to maintain aspen on the landscape.

RECREATION

This section of the assessment will discuss past outdoor recreation and transportation uses. The ancestors of the Shoshone and Bannock tribes used the project area for hunting, fishing and gathering. While these would be considered survival activities, at times they could have been characterized as recreation. European trappers moved into the area in the 1830s to pursue beaver and other fur-bearing animals.

The "conservation movement" in the United States began in the last half of the nineteenth century. During this time, city and federal governments began to consider the need for parks and reserves to protect natural resources and to provide places for recreation and leisure. When the community of Pocatello became established in the 1880s, residents used the surrounding foothills and uplands for hunting, fishing, and the occasional wagon ride and picnic. The Caribou Forest Reserve was set aside by President Theodore Roosevelt in 1906 to protect the watersheds that provide drinking water for the City of Pocatello. These lands include the southern slopes of Kinport Peak, Gibson Mountain, Slate Mountain and portions of the Mink Creek drainage, including Indian Mountain, Scout Mountain, and Old Tom.

According to the written accounts of Forest Ranger Sterling Justice, who began his career on the Caribou Forest Reserve in 1908, early forest rangers were preoccupied with managing the cattle and sheep use of the new forest reserve. Recreation uses were not actively managed.

Dispersed and Developed Camping

Overnight camping was probably associated with hunting and fishing trips in the early days of the Forest Reserve and beyond. Scout Mountain Campground and Picnic Area were established shortly after the Scout Mountain Road was built in 1918. The next major expansion of recreation facilities occurred with the Civilian Conservation crews in 1933. CCC crews built the Cherry Springs Campground during this time. In the mid-1960s many recreation facilities and campgrounds were replaced as part of the Accelerated Public Works Program of the Forest Service. Camping use continued to increase with area populations and Scout Mountain Campground was expanded to over 25 units in the early 1980s.

In the mid-1980s, Cherry Springs Campground was closed due to repeated vandalism. Cherry Springs was reopened as a day-use nature area in 1986. By late 1980s Scout Mountain Campground suffered from a lack of security and deteriorated facilities and many families would not use the campground. Starting in 2000 the Scout Mountain Campground was reconstructed with new facilities and hosts were used to discourage loud parties and vandalism.

People who desire a more rustic setting, no fee and less crowding prefer to disperse camp. Areas along the Scout Mountain Road and the South Fork of Mink Creek have

been used for dispersed camping for many decades. Dispersed camping along the State of Idaho's land parcel on the East Fork of Mink Creek was an on-going problem with large parties, people camping beyond the State's stay limit and people dumping garbage. During the 1980s the State of Idaho and the Forest Service worked cooperatively to patrol, sign and gate this heavily-used area.

Winter Recreation

Alpine skiing was discovered by local Pocatello residents in the mid-1930s. Lead Draw served as a downhill ski area, facilities and activities were managed by local volunteers. This area was abandoned during the WWII years, and skiing activities moved to the slopes of Bonneville Peak, outside the analysis area. Beginning in the early 1970s, winter recreation within Mink Creek grew with the popularity of Nordic skiing and snowmobiling. Local cross-country ski enthusiasts and ISU Outdoor Center helped to create a Nordic trail ski system with plowed parking lots along the Bannock Highway in the early 1980s. Travel planning in 1986 segregated some areas for non-motorized winter use. These areas include Valve House, Porcelain Pot and the West Fork of Mink Creek. These areas are served by Park N'Ski lots, which require a sticker for use. Sticker funds cover the costs to plow the lots. In the late 1990s the East Fork of Mink Creek Nordic Center was established under special-use permit with the City of Pocatello.

Transportation and Travel Management

Ranger Justice's writings mention clearing trails for horse travel, the "game" trails created by wild horses running the ridges, and the "good" trail through the West Fork of Mink Creek. Horse and wagon trails were needed for basic management of the forest, many preceded our road system and some still function as horse trails. In 1918 the residents of Pocatello asked the Ranger to provide a reliable road into Mink Creek for picnicking and camping. Ranger Justice improved the old logging road into the East Fork of Mink Creek with $100.00 and 200 pounds of TNT. The South Fork of Mink Creek Road and other various improvements were built by the local CCC crew in the 1930s.

A proliferation of unplanned roads and trails appeared within the analysis area with the increase of recreation use. Travel planning is the formal process of designating the type of travel and seasons of travel on roads and trails on public lands. Beginning in 1984, motorized and mechanized (mountain bike) travel has been restricted to designated routes on National Forest system lands within the analysis area. Motorized travel on BLM lands along the western bench of the City of Pocatello was also restricted to designated routes at this time. City lands on the lower benches of the watershed did not have travel restrictions until the 1990s or later.

Hunting, Fishing and Gathering Forest Products

At the turn of the century, many public outdoor pursuits centered on hunting, fishing and gathering forest products for subsistence. The Justice writings mention the presence of

deer, grouse and sage hens, and the lack of hunting pressure in the 1910s. Deer hunting was a common pursuit, but elk were not present in the area until they were transplanted in the 1920s. In the 1960s and beyond, beaver dams along Mink Creek offered a chance to catch trout within an easy distance of town. Firewood gathering of dead and down trees has been allowed within the analysis area for many decades. Special use permits for gathering forest products such as cones, willows, rock, and Christmas trees has been discouraged in the last few decades due to concern of overharvest.

CULTURAL RESOURCES

Ethnographic and archaeological investigations have indicated extensive tribal use and occupancy of the analysis area for thousands of years. Farnham (1843) says that "Snakes" or "Shoshones" occupying a considerable portion of country on Snake River above and below Fort Hall "subsist on the fish of the streams, buffalo, deer and other game." Well into historic times, the Bannock and Shoshone wintered together. The tribes wintered in various areas such as Lincoln Creek, on the Blackfoot River near its mouth, upstream on Lincoln Creek, and on the Portneuf River as far as Lava Hot Springs (Steward 1938**).** The Pocatello Valley was an important winter area for the Shoshone-Bannock Tribes. Small parties would hunt the various drainages for big game, roots, plants and berries. During spring and summer months, small bands would leave winter encampments for various seasonal "rounds". Major subsistence activities for the rest of the year included; hunting large big game including antelope, deer, and bison to the east; going south especially to the Bear Lake area to hunt bighorn, waterfowl, other game and to collect berries, roots and fish; and going west to fish for salmon, dig for camas root, procure pine nuts, as well hunting and trading.

Photo 18: Shoshone-Bannock Winter Camp in South Pocatello (1884)

Cultural Resources investigations within the Portneuf Watershed Analysis area began after the passage of the National Historic Preservation Act in 1966 and the National Environmental Policy Act of 1969. Cultural resource data were obtained mostly through

descriptive, project specific, surface surveys, usually conducted by Forest personnel. Thus, there is a lack of systematic collection of artifacts and also a lack of research design for most projects.

The study area has a rich history of resource exploitation by early inhabitants. The subsistence resources are diverse and abundant. Early groups exploited the marsh and riverine areas, valleys, foothills and mountain areas.

To date, the archaeological record within the analysis is reflective of the high mobility of the hunting and gathering economy of the inhabitants of this area. Prehistoric artifact assemblages include primarily projectile points, performs, scrapers, bifaces, manos, and metates. The artifact assemblage is quite diverse considering the general lack of survey and sub-surface investigations within the analysis area.

It appears that slope and water resources were a central factor for prehistoric inhabitants when determining site placement. Aspect is another variable that appears to have been important, with southern exposure being most prevalent. With these very basic predictors, the study area is comparable to site location information for the Targhee National Forest north of the study area. McDonald (1983) found that culturally sensitive zones on the Targhee are based on three critical elements: 1) distance to water, within 656 ft of water 2) Slope, most sites are situated on slopes of less than 5 percent, and, 3) vegetation, are within or adjacent to sagebrush openings or meadows. Without additional data, it appears that this very basic pre historic site predictive model stands true for the Portnuef watershed analysis area.

In addition to Native American activities, railroad workers and ranchers entered the Portneuf area in around 1888 when 1,840 acres of the reservation were ceded for the creation of Pocatello. This was in conjunction with the construction of the railroad line to the north and west. Signs of Native American inhabitance as well as the railroad and agriculture industries are important to the history of the analysis area and should be preserved. The analysis area also has homesteading and CCC era remnants that should be preserved and protected.

CURRENT CONDITIONS

SOILS AND GEOLOGY

Purpose

To focus the analysis on the key elements of the ecosystem that is relevant to the management questions and objectives, and resource conditions of the watershed.

To describe the existing conditions of the watershed relevant to the issues.

Photo 19: View of Scout Mountain from the south, highest peak in the watershed.

Data Sources used in this section of the analysis include:

- Field notes (Lott and Kleinschmidt, 2009)
- Erosion Report, Snake River Basin (USDA SCS 1979)
- Watershed Management on Range and Forest Lands (Meeuwig et al. 1975)
- Stable states and thresholds of range condition on North American rangelands: A viewpoint (Laycock 1991)
- Range condition assessment and the concept of thresholds: A viewpoint (Friedel 1991)
- Sediment reduction through watershed rehabilitation (Noble 1963)
- Caribou National Forest Range Environmental Analysis Data (REA 1970-1982)
- Effects of trampling disturbance on watershed condition, runoff, and erosion (Packer, 1953)
- Changes in Soil Physical Properities under Grazed Pastures (Willatt et al. 1984)
- Soil Survey of the Bannock County Area, Idaho (USDA, NRCS 1987)
- Hierarchical Stratification of Ecological Units on the Caribou National Forest (USDA-FS 1998)
- Soil Survey of the Caribou National Forest, Idaho (USDA-FS 1997)

Data Gaps identified in this section of the analysis include:

- An ecological unit inventory was conducted for this report. Existing available data was also used to make inferences about current conditions and trends. Site-specific riparian inventories should be conducted to verify all inferences in this report. An inventory of acres of major land disturbances within the watershed would also be useful.
- Long-term erosion studies and ground cover studies
- Updated landslide inventory map
- Identified detrimentally disturbed soils in the watershed.

Erosion Processes

The amount of erosion occurring on the uplands in the watershed is directly related to the amount of protective ground cover found on a specific area. Ground cover on most undisturbed upland sites appears to be adequate to protect the soil from erosion. Areas of concern related to erosion caused by grazing and off-road vehicles were identified on upland slopes that drain into the South Fork of Mink Creek. In some areas, soils in the watershed have been impacted from dispersed recreation and camping near the South Fork. Less than 500 acres of uplands were identified as having deteriorated soil conditions during preliminary field visits. Gullies and rills were also noted on some trails and non-maintained roads such as FS road 009, Scout Mtn. Top Road, and FS Road 344 Box Canyon Road. Past restoration efforts have improved rangeland and soil conditions on areas where protective measures such as fencing and reseeding have been used.

Some soils that formed from loess on steeper slopes have more potential to erode than others because they are more easily detached. Soils that have lost protective ground cover tend to erode more easily. An example of eroded soils is shown in Photo 20 found on Forest Trail 504. This is an example of accelerated erosion in the former trail tread.

Photo 20: Gully erosion occurring on Trail 504.

Currently, recreation activities, recent disturbances from timber harvest activities, and continued rangeland uses in the watershed have had the most impact on the soil resource and erosion processes. Although not significant in the majority of the watershed, pioneered trails created by off-highway vehicles (OHV) have caused soils to erode at an accelerated rate on the uplands where they occur (see Photo 21).

Photo 21: Tread loss from erosion on trails.

Camping and recreation use along some riparian areas near East Fork of Mink Creek have compacted soils and impacted stream banks. This area has recently been closed to such use. Soil compaction and erosion from recreational use has been well documented (Meewig et al., 1975). Dispersed camping in the ponderosa pine plantations have exposed excess bare soil and caused soils to be compacted. Accelerated erosion has been noted in these areas.

Approximately 150 acres have been adversely affected by recreation use in the watershed. Because of the extent and amount of disturbance related to recreation use, a complete inventory of restoration needs should be documented and a plan developed for scheduled restoration work.

Slope also has a strong influence on erosion. Most of the slopes in the Lower Portneuf watershed are less than 40% slope. The WEPP (Water Erosion Prediction Program) model shows little or no erosion occurring on slopes with less than 40% when ground cover is maintained at 60%.

Current Conditions - Ground Cover

Literature related to rangeland condition thresholds and stable states of rangeland condition suggests that plant communities and conditions remain relatively unchanged for

long periods unless a catastrophic event occurs such as a wildfire (Laycock 1991 and Friedel 1991). If these hypotheses are true, ground cover conditions are probably much the same today as they were when this information was collected in the 70's and 80's except on sites that have been disturbed by fire, mechanically treated, or have had herbicide applications. Noble (1963) studied the effects of ground cover on surface runoff and erosion. His results indicate that in the Intermountain West, a minimum of 60-70 percent ground cover is needed to effectively control surface runoff of water and erosion occasioned by torrential summer rainstorms. Percent ground cover that is less than this amount causes soil loss to increase at a rapid rate. Reduction of cover and standing crop also exposes the soil more directly to the erosive force of wind. Ground cover was documented to be less than desirable on areas where *Wyethia amplexicaulus* has become the dominant species. These areas often have clayey soils that are difficult to re-vegetate. Photo 22 shows an area that is dominated by mules ear.

Photo 22: Area where mulesear has become the dominant species on Scout Mountain Top road.

Range Environmental Analysis (REA, 1960-1982) data collected during the 1960's and 1970's documented ground cover on the site analysis worksheets and estimated ground cover on the ocular analysis worksheets for allotments found in the watershed. These data were analyzed for each major cover type grouping that occurs in the watershed. Site conditions for these cover type groupings were analyzed by averaging all observations and measurements in these groupings. The result of this analysis follows:

Table 17: Bare soil per cover type.

Group 1. *Big Sagebrush Cover Type*

Bare Soil %	**22.1**
Vegetation/Litter/Rock %	**77.9**
Observation Number	**213**

Group 2. *Mountain Brush Cover Type*

Bare Soil %	**24.0**
Vegetation/Litter/Rock %	**76.0**
Observation Number	**90**

Group 3. *Riparian Cover Type*

Bare Soil %	**1.0**
Vegetation/Litter/Rock %	**99.0**
Observation Number	**10**

Group 4. *Conifer Cover Types*

Bare Soil %	**9**
Vegetation/Litter/Rock %	**91**
Observation Number	**31**

Group 5. *Aspen Cover Type*

Bare Soil %	**13.4**
Vegetation/Litter/Rock %	**86.6**
Observation Number	**166**

Group 6. Juniper*, Maple, Curlleaf Mahogany Cover Type*

Bare Soil %	**28.3**
Vegetation/Litter/Rock %	**71.7**
Observation Number	**49**

Regional and landscape scale indicators for properly functioning condition on these habitat type groupings provide ground cover requirements (USDA 1996). On big sagebrush/grassland ecological types, there should be less than 20 percent bare ground or 80 percent ground cover. A balanced range of age classes is required for aspen, Douglas fir and lodgepole pine types. No ground cover requirements are mentioned for these forested ecological types because they are generally above 90 percent in undisturbed conditions. The REA data collected on the watershed as shown in Tables B through G above indicates that most of the forested and rangeland sites are within or near properly functioning condition when comparing ground cover criteria (USDA 1997).

Mass Stability

A small portion of the watershed (approximately 9,600 acres) has unstable landforms that are subject to mass instability and landslides. Land types that have been identified as being unstable are 304 and 475. Although these areas have characteristics that would indicate unstable or landslide prone conditions, few landslides have been identified in the area. An active landslide occurs on the Bannock Highway 43A near the intersection of Forest Road 163, South Fork Mink Creek Road.

Riparian Soils

Riparian and wetland areas include areas where free and unbound water is present at least seasonally in the upper soil profile. According to the 1996 Properly Functioning Condition Assessment of the Intermountain Region, negative effects on riparian areas include lowering of the water table, erosion in stream channels, exotic plant encroachment, and changes in vegetation. Trampling of riparian soils by livestock was observed in some locations within the watershed particularly on South Fork Mink Creek, Indian Creek, and Walker Creek. Other areas sensitive to compaction such as the bog in Elk Meadows have also been affected by heavy grazing.

Studies indicate that animal treading increases bulk density and decreases air permeability and hydraulic conductivity that affects soil productivity (Willatt and Pullar 1984). It has been noted that on healthy range, the top layer of soil is usually the most permeable, the most fertile, and often the most resistant to detachment (Meewig et al. 1975). Excessive trampling by grazing animals causes an increase in runoff and erosion (Packer 1953).

Some private holdings have recently been developed on the north and east portions of the watershed in Mink Creek, Walker Creek, and other areas, taking land out of production. These housing developments usually occur near streams which also impact watershed health. This trend is likely to continue in the future.

Geology and Minerals

From a geologic perspective, there is no need for further discussion of the current conditions beyond what was provided in Chapter 1. The geology generally changes imperceptibly slowly except areas including active volcanism or areas highly susceptible to mass movement, etc. The geology has not recently changed significantly, nor is it anticipated to in the near future (speaking in geologic time frames).

The one aspect of the core topics and questions that is relevant from a minerals perspective beyond what is included in Chapter 1 is the Human Uses topic. Two areas possibly needing further consideration include: saleable mineral (mineral materials) activity and gold suction dredging activity. Because of the unknowns and uncertainty regarding potential future oil/gas, geothermal, and other locatable mineral development, they will not be discussed further in this section.

There may be potential sources of gravel (pit run or crushed) on NFS lands within the watershed. Randy Tate, a former FS engineer familiar with the area, said such a source (for crushing) may be present near the head of Corral Creek. If these sources are needed, they would need to be evaluated further. Other potential sources of rock for crushing could be present in the area based on the occurrence of durable rocks like limestone and quartzite.

If new sources are needed in the watershed to accommodate future road related needs, those sources would need to be located, evaluated for suitability, and developed. Since that demonstrated need is not great at this time, possible locations for such use will not be evaluated in this assessment, but could be done later if/when the need arises.

The Forest often receives requests from private individuals for permits to obtain rock for personal uses such as landscaping. If a source, near an existing road, with plentiful material of the size desired was found/developed, it could help supply that legitimate demand for a forest product. However, commercial sources for such rock are present locally, as are sources for private use on BLM lands in the area.

The disposal of mineral materials by the Forest Service is a discretionary activity, under authorities belonging to the Forest Service (36 CFR 228, subpart C). In this regard saleable minerals differ from leasable or locatable minerals, where the BLM is actively involved. Mineral material development could be precluded in this watershed if the FS deemed it was necessary to protect other resource values or uses.

Based on recent expressed interest for suction dredging in Mink Creek, it is timely to discuss the availability of these waters for inclusion in the State's recreational gold suction dredging one-stop permitting process. If the price of gold remains high (over $1,000.00/oz.), it is likely there will be continued interest in suction dredging.

Under the State's "one-stop" program, the surface management agencies are contacted annually and asked which streams are to be included in the program. If streams or stream reaches are included in the program, a recreational dredger simply goes to the State Dept. of Water Resources and files an application (short form) and purchases a state-wide permit ($10.00) that allows them to suction dredge in any open waters in the State, as long as they use equipment with a five inch or less nozzle size and 15 or less horse power engine. Restrictions, such as timing, can be placed on streams open to this process. These "short form" permits would be included in the EPA's general NPDES permit for suction dredging in Idaho (currently being developed). The owner of a recreational suction dredging permit is required to file a Notice of Intent of operate with the Forest Service prior to the start of dredging if NFS lands are involved.

For streams that are closed to the "short form" or "one-stop" approach, the applicant is required to submit the "long form", which requires State Department of Environmental Quality, Army Corp of Engineers, and surface management agency involvement. It also requires an individual NPDES permit from the EPA; it may also require the approval of a mineral Plan of Operations from the FS.

WATER

"There is hardly an acre of the … watershed that does not tell its own story to those who understand the speech of hills and rivers." - Aldo Leopold

Indicators of the hydrologic and watershed conditions on NFS lands include:

- Water Quality: State assessments reports and TMDLs
- Inland Water West Initiative (IWWI) watershed ratings
- Properly function condition (PFC) assessments
- Hydrologic disturbance
- Field Inventories

Water Quality: Table 1 and Figure summarize the following IDEQ documents concerning current water quality on NFS lands within the analysis area:

- Idaho 2008 Integrated (303[d]/305[b]) Report (IDEQ 2009b)
- Portneuf River TMDL, Water Body Assessment and Total Maximum Daily Load (IDEQ 1999)
- DRAFT Portneuf River TMDL Revision and Addendum (Ray 2009)
- American Falls Subbasin Total Maximum Daily Load Plan: Subbasin Assessment and Loading Analysis (IDEQ et al. 2009).

Table 18: Water quality summary for NFS lands (IDEQ 2009b & 1999, Ray 2009, & IDEQ et al. 2009).

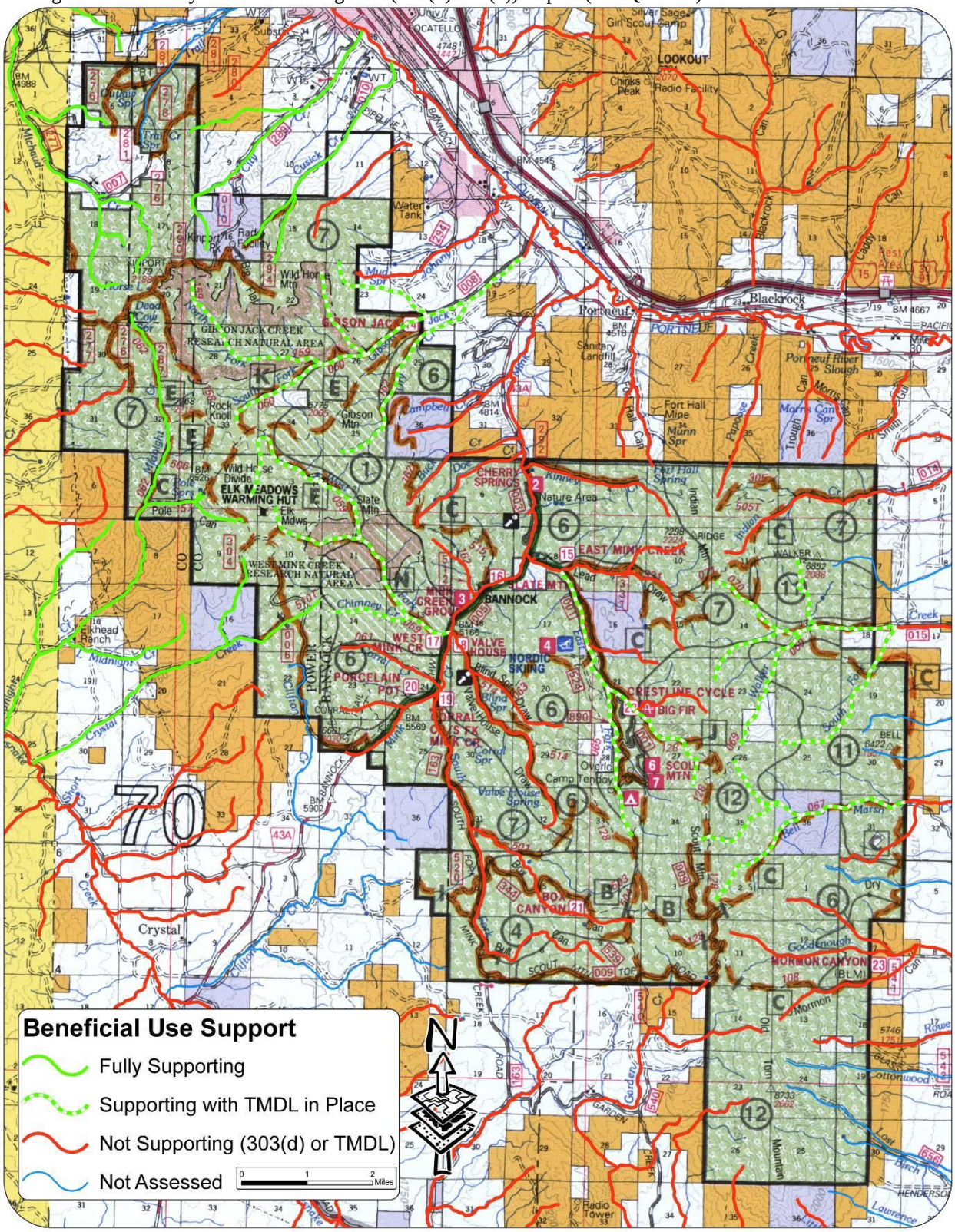
Assessment Unit	Other Relevant Streams	Beneficial Uses Support[1]	303(d) and/or TMDL comments
ID17040206SK002_02: Bannock Creek	Birch Creek	Not Supporting CWAL & PCR	303(d) listed for fecal Coliform (E. coli) & sediment. Nutrients also suspected.
ID17040206SK010_02a: Crystal Creek		Fully Supporting CWAL & SS	
ID17040206SK011_02: Clifton Creek		Not Assessed	
ID17040206SK012_02: Midnight Creek		Fully Supporting CWAL & SCR	
ID17040206SK013_02: Michaud Creek		Fully Supporting CWAL, SS, & SCR	
ID17040208SK001_02: Portneuf tributaries-Marsh Creek to American Falls	Fort Hall Canyon	Not Supporting CWAL	EPA approved TMDLs for Nitrogen, Oil & Grease, Phosphorus, & Sediment.
ID17040208SK001_02a: Cusick Creek		Fully Supporting CWAL	N/A
ID17040208SK001_02b: Trail Creek		Not Assessed	N/A
ID17040208SK001_02c: Papoose Creek		Fully Supporting CWAL. Not Supporting SCR.	303(d) listed and Draft TMDL for E. coli.
ID17040208SK002_02: City Creek		Fully Supporting CWAL & SCR	N/A

Assessment Unit	Other Relevant Streams	Beneficial Uses Support[1]	303(d) and/or TMDL comments
ID17040208SK003_02a: Upper Gibson Jack Creek	South & North Forks	Fully Supporting SS, SCR. Supporting CWAL* (see comment)	*EPA approved TMDL for sediment (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River sediment TMDL. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK004_02: Mink Creek Tributaries-source to mouth	Valve House Draw, Buck, Doe, & Corral Creek	Not Supporting CWAL	EPA approved TMDLs for Nitrogen, Phosphorus, & Sediment.
ID17040208SK004_02a: Kinney Creek		Not Supporting CWAL	EPA approved TMDLs for Nitrogen, Phosphorus, & Sediment.
ID17040208SK004_02b: West Fork Mink Creek	Chimney Creek	Fully Supporting SS, SCR. Supporting CWAL* (see comment).	*EPA approved TMDLs for sediment, nitrogen, and phosphorus (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK004_02c: South Fork Mink Creek		Fully Supporting SS. Supporting CWAL* (see comment). Not Supporting SCR.	303(d) listed and Draft TMDL for E. coli. *EPA approved TMDLs for sediment, nitrogen, and phosphorus (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK004_02d: Upper East Fork Mink Creek		Fully Supporting SS. Supporting CWAL* (see comment).	*EPA approved TMDLs for sediment, nitrogen, and phosphorus (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK004_03: Lower East Fork Mink Creek		Not Supporting CWAL	EPA approved TMDLs for sediment, nitrogen, and phosphorus.
ID17040208SK004_03a Mink Creek	Mink Creek Between East & South Forks	Not Supporting CWAL	EPA approved TMDLs for sediment, nitrogen, and phosphorus.
ID17040208SK004_04 Lower Mink Creek		Not Supporting CWAL & SCR.	EPA approved TMDLs for sediment, nitrogen, and phosphorus. 303(d) listed and Draft TMDL for E. coli.
ID17040208SK004_04a Mink Creek		Fully Supporting SS. Supporting CWAL* (see comment). Not Supporting SCR	303(d) listed and Draft TMDL for E. coli. *EPA approved TMDLs for sediment, nitrogen, and phosphorus (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK005_02 Indian Creek		Fully Supporting CWAL. Not Supporting SCR.	303(d) listed and Draft TMDL for E. coli.

Assessment Unit	Other Relevant Streams	Beneficial Uses Support[1]	303(d) and/or TMDL comments
ID17040208SK006_02: Marsh Creek Second Order Tributaries	Lost, Cottonwood, and Birch Creeks	Not Assessed	
ID17040208SK007_02a Upper Walker Creek	South Fork Walker Creek	Fully Supporting SS. Supporting CWAL* (see comment).	*EPA approved TMDL for sediment (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK008_02 Bell Marsh Creek Tributary	Southern Tributary	Not Supporting CWAL	EPA approved TMDLs for sediment, nitrogen, and phosphorus.
ID17040208SK008_02a Upper Bell Marsh Creek		Fully Supporting SS, SCR. Supporting CWAL* (see comment).	*EPA approved TMDLs for sediment, nitrogen, and phosphorus (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.
ID17040208SK009_02 Lower Goodenough Creek Tributary	Rowe Creek	Not Supporting CWAL	EPA approved TMDL for sediment.
ID17040208SK009_02a Upper Goodenough Creek	Mormon Canyon	Fully Supporting SCR. Not Supporting CWAL.	EPA approved TMDL for sediment.
ID17040208SK010_02 Garden Creek Tributaries		Not Supporting CWAL	EPA approved TMDLs for sediment, nitrogen, and phosphorus.
ID17040208SK010_02a Upper Garden Creek		Fully Supporting SS. Supporting CWAL* (see comment) Not Supporting SCR.	303(d) listed and Draft TMDL for E. coli. *EPA approved TMDLs for sediment, nitrogen, and phosphorus (officially listed as not supporting CWAL). Although this AU supports CWAL, it was included in the Portneuf River TMDLs. If this AU continues to support beneficial uses, it will be moved to "fully supporting" in ensuing reporting cycles.

[1] – CWAL = coldwater aquatic life; SS = salmonid spawning; & SCR = secondary contact recreation.

Figure15: Summary of the 2008 Integrated (305(b)/303(d)) Report (IDEQ 2009a) on Forest.



Within water quality AUs that are 303(d) listed, the Forest must ensure that cost effective BMPs or knowledgeable and reasonable control measures have been or are properly implemented as part of projects so that no further degradation occurs or that waters are improved (IDEQ Policy for No-Net Increase, PM98-2) (USDA FS 2004).
Through a MOU with the State of Idaho (USDA FS 2008), the U.S. Forest Service is the designated agency for NFS Lands. The Forest is therefore revising its Portneuf River TMDL Implementation Plan in concert with IDEQs TMDL revision. The Forest's plan will provide a framework for achieving the TMDL goals on NFS Lands. The recommendations listed in Chapter 5 below will be incorporated into the Forest's implementation plan.

Portneuf TMDL Summary: On NFS lands, TMDLs are being revised for sediment/total suspended solids (TSS), total phosphorus (TP), bacteria (E. coli), oil & grease, and total nitrogen (TN) (Ray 2009). The beneficial uses affected by these pollutants include coldwater aquatic life and primary and secondary contact recreation (IDEQ 2009b). The load allocations are based on the following target concentrations.

- TSS: Less than 35 mg/L (low flow) and 80 mg/L (high flow)
- TP: Less than 0.07 mg/L (low flow) and 0.125 mg/L (high flow)
- E. coli: Not to exceed monthly geometric mean (minimum of five samples) of 126 *E. coli* organisms/100 ml of water (State Water Quality Standard).
- Oil & Grease: Less than 5 mg/L
- TN: Less than 1.0 mg/L for tributaries to the Portneuf River

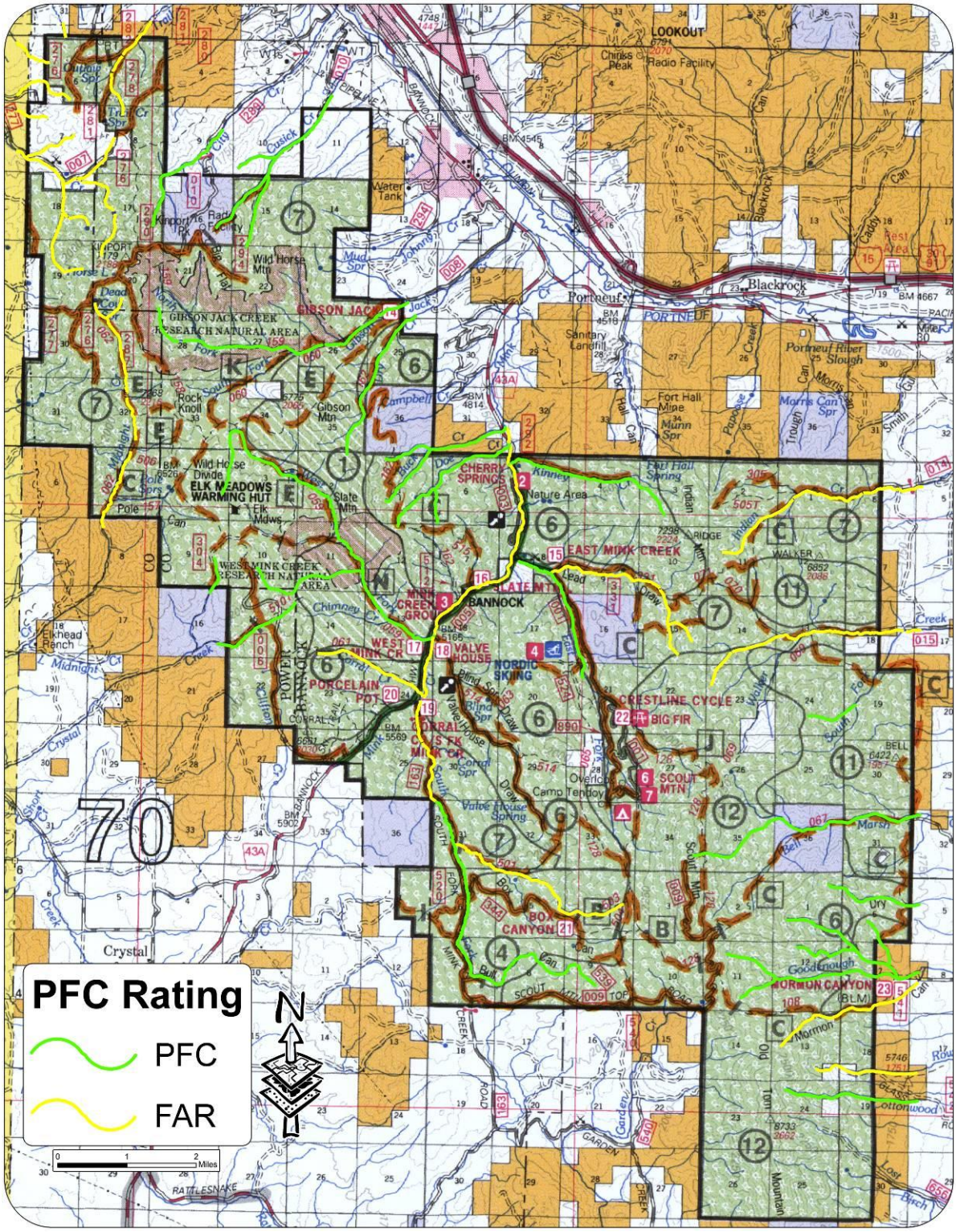
IWWI: The IWWI (USDA FS 2000) evaluated federal lands in the Great Basin and Rocky Mountain areas using common criteria. The analysis focused on three factors:

- Watershed vulnerability is the inherent risk of instability due sensitive lands (e.g. highly dissected slopes, highly erodible soils, landslide deposits, or landslide prone areas). All subwatersheds in the analysis area are rated as "Moderate" (20-50% sensitive lands).
- Geomorphic integrity is the functioning condition of the watershed, streams, and riparian areas. The Gibson Jack Creek subwatershed was rated as fully functioning. The East Fork Mink Creek subwatershed was rated as damaged (> 20% not fully functioning). All the remaining subwatersheds were rated as "moderate" (< 20% not fully functioning). West Fork Mink Creek would have been considered fully functioning as well, but this drainage was contained within the larger Upper Mink Creek subwatershed.
- Water quality integrity: Adequate protection of water-related resource values. All subwatersheds in the analysis area were rated as Moderate (<20% impaired). This category is most subject to change with TMDL revisions and state water quality assessment updates. On Forest, the Lower Rattlesnake, Michaud, and Trail Creek subwatersheds should now be rated as undamaged (0% impaired). The Bell-Marsh, Garden, Gibson Jack, Goodenough, Mink, and Indian Creek subwatersheds would be considered highly damaged (>20% impaired).

A composite rating of the three categories was used to set high, moderate, and low priority watershed rating. All the subwatersheds in the analysis area have a composite rating of "moderate" priority. Although the State of Idaho recently updated the sixth-level hydrologic unit codes (HUCs or watershed boundaries), the composite ratings appear valid for the new sixth-level subwatersheds boundaries.

Proper Functioning Condition (PFC) Assessments: Possible ratings include, PFC, functioning at risk (FAR), and non-functioning (USDI BLM et al. 1998 & 2003). The minimum goal is for stream channels to be PFC. **Figure** shows summarizes the PFC data within the analysis area.

Figure 16: Summary of PFC data on the Forest (includes recent field data from 2007-2009).



Hydrologic Disturbance: A guideline of the Caribou RFP is that "not more than 30% of any of the principal watersheds and/or their subwatersheds should be in a hydrologically disturbed condition at any one time." Table 1 shows the current hydrologic disturbance

for subwatersheds in the analysis area. The analysis includes the proposed South Fork Mink Creek proposed burn (Higginson 2008). Appendix A provides more information on the analysis. All the subwatersheds that are over 30% are due to their relatively small size. These subwatersheds represent a very small percentage of the HUC area (including off-Forest land). Therefore, the actual watershed level hydrologic disturbance would be much less than the amount shown in the table below.

Table 19: Current hydrologic disturbance within the analysis area.

Watershed	Analysis Area (acres)	Hydrologic Disturbance (acres)	Hydrologic Disturbance (%)
Caribou PWI 19: Marsh Creek	17,517	440	3%
170402080402: Garden Creek	2,646	37	1%
170402080403: Goodenough Creek	5,179	12	0%
170402080404: Bell Marsh Creek	9,667	390	4%
170402080503: Indian Creek	6	1	23%
170402080504: Mink Creek	19	0	1%
Caribou PWI 20: Lower Portneuf	40,793	6,004	15%
170402060901: Upper Rattlesnake Creek	91	5	5%
170402060902: Lower Rattlesnake Creek	619	77	13%
170402060904: Michaud Creek	7	4	58%
170402080402: Garden Creek	183	25	13%
170402080404: Bell Marsh Creek	18	3	16%
170402080503: Indian Creek	2,454	535	22%
170402080504: Mink Creek	27,590	2,723	10%
170402080505: Gibson Jack Creek	7,813	1,619	21%
170402080507: Trail Creek	2,013	1,013	50%
Caribou PWI 21: Rattlesnake Creek	8,224	1,140	14%
170402060902: Lower Rattlesnake Creek	4,283	548	13%
170402060903: Starlight Creek	844	271	32%
170402060904: Michaud Creek	2,466	300	12%
170402060905: Eagletail Rock	423	4	1%
170402080504: Mink Creek	189	11	6%
170402080505: Gibson Jack Creek	10	0	5%
170402080507: Trail Creek	10	6	64%

Hydrologic Disturbance Analysis

Definitions: The Caribou RFP (pg RFP Glossary-15) defines hydrologically disturbed and hydrologically recovered:

Hydrologically Disturbed Condition: *"Changes in natural canopy cover (vegetation removal) or a change in surface soil characteristics (such as compaction) that may alter natural streamflow quantities and character. Acres of vegetation within a watershed that are in a non-stocked, seedling, sapling, or first entry category; acres in roads; acres from*

other types of mechanical treatments and burned acres are included in the calculation of hydrologically disturbed area."

Hydrologically Recovered Condition: "*Vegetative life form where natural canopy coverage is achieved and subsequent streamflow quantities and character (timing and amount) reflect more natural conditions. Within the forested ecosystem, this equates roughly with the sapling/early pole life form. This life form is achieved at approximately 20 – 30 years of age, depending on cover type and inherent site productivity potentials. Within the non-forested ecosystem, this equates roughly to 80% or pre-fire ground cover, which ever is less, approximately 3-5 years following treatment, depending on inherent site productivity potentials. Roads are considered hydrologically recovered if obliterated or ripped and drained and have 80% or more ground cover."*

Data sources/GIS (geographic information system) layers:

"cnf_harvests": harvest units compiled from District quads

- "cnf_veg2001": existing veg., satellite image class from early 1990's imagery updated to reflect disturbances such as harvest, wildfire, mining; 100k"
- "CT_fires.shp": current fire history layer as of January 2008
- "cnf_fprx08_83": Revised Forest Plan management prescriptions – used to identify developed, special use authorization, and dispersed recreation areas
- "cnf_trav07_83": road & trail inventory as of 2007
- "ct_wsh2009_83": Idaho sixth-level hydrologic unit code layer
- "cnf_pwi_sheds.shp": Caribou NF project work inventory (PWI) watersheds; used in 2003 Revised Forest Plan
- "bannock2004_NAD83.sid": 2004 NAP aerial photograph of the area

Estimating current and past disturbance:

- "cnf_harvests": All previously harvested stands identified by this layer were considered to be hydrologically disturbed. This conservative approach is taken because no field review has been conducted to determine whether stands are hydrologically recovered.
- "CT_fires.shp": This layer includes several past fires in the analysis area: Country Fire (1998), Crestline (2000), Gale (2006), Garden Gap (2001), Haskett (2001), Lead Draw (2006), Mink Creek (2006), Rattlesnake (2005), Wild Horse (2006), and un-named fires (1987, 1988, & 1992). All burned areas identified by this layer were considered to be hydrologically disturbed. This conservative approach is taken because no field review has been conducted to determine whether the burns are hydrologically recovered.
- "cnf_trav07_83": Using the "TP_ALT5R" and "IMP_SYS" attributes of this layer, roads and trails were given the following buffers to estimate disturbance area:

Table 20: Road and Trail buffer widths for hydrologic disturbance estimate.

Road or Trail Type	Buffer Width (ft)
Access& high clearance roads/trails & obliterated & closed roads (access, nfs, ro_hc, ob & rc)	20 ft (10 ft each side)
ATV trails (atvs)	6 ft (3 ft each side)
Paved Roads (ro_pass - paved)	50 ft (25 ft each side)
Non-paved roads (ro_pass)	40 ft (20 ft each side)
Other Trails (bike, foot, foot_nh, mcycle, & tc)	4 ft (2 ft each side)

- "bannock2004_NAD83.sid": I digitized several disturbed areas observed on this aerial image (e.g. residential developments & dispersed camp areas).
- "hd_pwi_huc6.shp": I created this shapefile as a union of the hydrologically disturbed areas discussed above, PWI watershed 19, 20, & 21 and the subwatershed HUC GIS layers. I exported the shapefile data to an Excel spreadsheet in order to perform calculations: "lwr_portneuf_HD.xls". The following table displays the current hydrologic disturbance in the analysis area.

Table 21: Existing hydrologic disturbance by principal watershed and subwatershed. Includes proposed South Fork Mink Creek Burn.

Watershed	Analysis Area (acres)	Hydrologic Disturbance (acres)	Hydrologic Disturbance (%)
Caribou PWI 19: Marsh Creek	17,517	440	3%
170402080402: Garden Creek	2,646	37	1%
170402080403: Goodenough Creek	5,179	12	0%
170402080404: Bell Marsh Creek	9,667	390	4%
170402080503: Indian Creek	6	1	23%
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170402060902: Lower Rattlesnake Creek	619	77	13%
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170402080404: Bell Marsh Creek	18	3	16%
170402080503: Indian Creek	2,454	535	22%
170402080504: Mink Creek	27,590	2,723	10%
170402080505: Gibson Jack Creek	7,813	1,619	21%
170402080507: Trail Creek	2,013	1,013	50%
Caribou PWI 21: Rattlesnake Creek	8,224	1,140	14%
170402060902: Lower Rattlesnake Creek	4,283	548	13%
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170402060905: Eagletail Rock	423	4	1%
170402080504: Mink Creek	189	11	6%

170402080505: Gibson Jack Creek	10	0	5%
170402080507: Trail Creek	10	6	64%

VEGETATION

Forested Vegetation

The forested vegetation in the analysis area was established through fire and succession. Succession is a progressive change in species. Very little vegetation manipulation has occurred in the timbered stands that comprise the analysis area. Some logging has occurred and remnant stumps can be seen in some places.

Fires in the area have been successfully suppressed for the last 90 years. Fire suppression has reduced fire frequencies and has allowed plant succession to continue towards later seral conditions (Steel et. al. 1983). Age class diversity is limited. Most of the forested vegetation is in the mature or older seral stages. Douglas fir is becoming more dominant as it encroaches on the stands of aspen and shrubs. It is likely that there is more Douglas fir in the watershed analysis area now, and less aspen, than existed historically (see Lower Portneuf River Watershed Vegetation Comparison 1914-2003). The current structure and composition of the stands is due to the lack of disturbance such as fire in the analysis area. The average range of fire intervals in the moist Douglas fir habitat types historically was 26-71 years, and as of 1994, the overall statistical mean since the last fire was 102 years (Barrett, 1994). This is about twice the length of the presettlement average fire interval. Fires in this type usually lead to dominance by one or more seral species such as aspen, created openings in dense stands, and create a mosaic of different ages and species compositions (Bradley et. al. 1992).

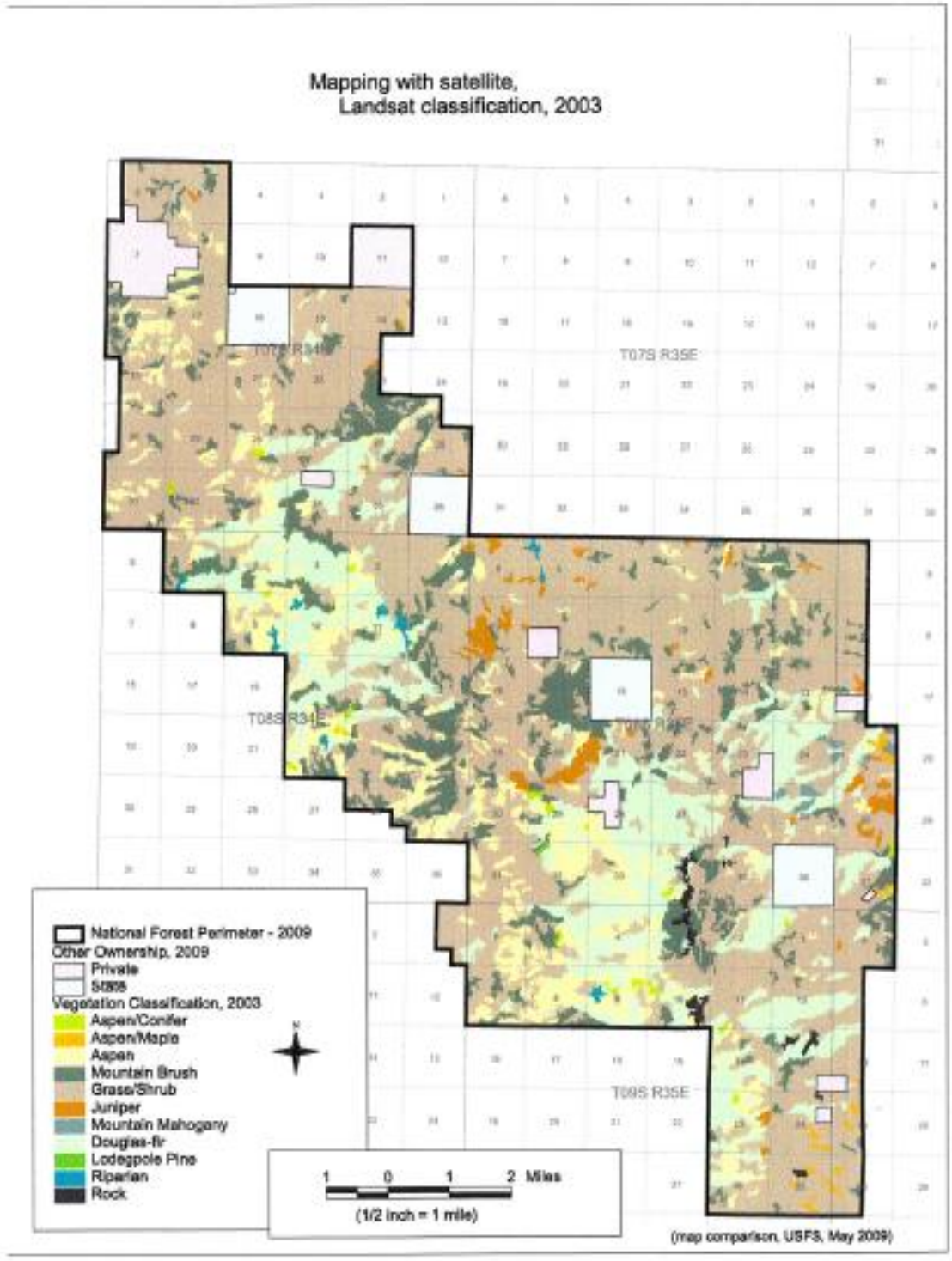
Aspen exist in primarily three different types (Bartos and Campbell 1998a); (1) stable, (2) successional to conifers, and (3) decadent and falling apart. Stable aspen is considered to be "properly functioning" and replacing itself (Bartos 2000). In many instances, these clones exist with a "skirt" or "fairy ring" of young regeneration around the edge and numerous sized stems in the interior. The stems are of various ages that resulted from pulses of regeneration that occurred at various times in the past. Generally, an individual standing near a stable clone has difficulty seeing into or through it. This is generally not the case in the analysis area, and many of these aspen stands have multiple conifers established within the stand.

Aspen stands ucceeding to conifers are responding to natural forces. Aspen is considered a disturbance species perpetuated on site by fire, disease, or other such occurrences (Bartos, 200). Some of these forces (primarily fire) have been altered by human intervention, which has given shade-tolerant conifers a marked advantage. In this analysis area, there are numerous situations where less desirable vegetation types such as Douglas fir, subalpine fir, or sagebrush are replacing aspen. In turn, these type conversions are modifying the sites dramatically.

Decadent clones are generally of a single age and are very open. Mature trees are not being replaced as they die because successful regeneration is lacking. Most of these clones attempt to reproduce, but the new shoots are consumed primarily by wild or

domestic ungulates. Clonal vigor is reduced as these regeneration events occur year after year. A person standing near a decadent clone can see into or through the clone.

Figure 17: Vegetation mapping with satellite, 2003



Research Natural Areas

Gibson Jack RNA

The Gibson Jack RNA and the West Fork of Mink Creek RNA were visited recently and stewardship monitoring reports will be completed during the winter of 2009. Shown here are photos highlighting the RNAs as seen today.

Photo 23: The first photo (5) was taken at a Douglas-fir/rocky mountain maple h.t. site and the second photo (6) was taken at mountain big sagebrush/mountain snowberry/mixed grass h.t. (veg. classification based on name given in the establishment record for the RNA). The third photo is looking across the drainage from photo number 6; the last photo (7) is a typical aspen shot taken from near the drainage. (EUI study- May 26, 2009)

Table 22: Cherry Springs Nature Area Plant Species List

by Cleve Davis

(updated 24Nov2009 by Rose Lehman)

Note: Names used are the accepted names as used in the PLANTS Database

Scientific Name	Common Name	Code
Vines		
Clematis ligusticifolia	western white clematis	CLLI2
Trees		
Abies lasiocarpa	subalpine fir	ABLA
Juniperus osteosperma	Utah juniper	JUOS
Juniperus scopulorum	Rocky Mountain juniper	JUSC2
Pinus ponderosa	ponderosa pine	PIPO
Populus tremuloides	quaking aspen	POTR5
Pseudotsuga menziesii	Douglas-fir	PSME
Shrubs		
Acer glabrum	Rocky Mountain maple	ACGL
Acer grandidentatum	bigtooth maple	ACGR3
Acer negundo	boxelder	ACNE2
Amelanchier alnifolia	Saskatoon serviceberry	AMAL2
Artemisia	sagebrush	ARTEM
Artemisia tridentata	big sagebrush	ARTR2
Artemisia tridentata ssp. vaseyana	mountain big sagebrush	ARTRV
Betula occidentalis	water birch	BEOC2
Cornus sericea	redosier dogwood	COSE16
Crataegus douglasii	black hawthorn	CRDO2
Ericameria nauseosa	rubber rabbitbrush	ERNA10
Mahonia repens	creeping barberry	MARE11
Prunus virginiana	chokecherry	PRVI
Purshia tridentata	antelope bitterbrush	PUTR2
Rhus trilobata	skunkbush sumac	RHTR
Ribes aureum	golden currant	RIAU
Salix exigua	narrowleaf willow	SAEX
Salix lucida	shining willow	SALU
Salix lutea	yellow willow	SALU2
Sambucus nigra ssp. caerulea	blue elder	SANIC6
Symphoricarpos oreophilus	mountain snowberry	SYOR2
Toxicodendron rydbergii	western poison ivy	TORY
Graminoids		
Achnatherum hymenoides	Indian ricegrass	ACHY
Aegilops cylindrica	jointed goatgrass	AECY
Bromus inermis	smooth brome	BRIN2
Bromus tectorum	cheatgrass	BRTE

Carex spp.	sedge	CAREX
Leymus cinereus	basin wildrye	LECI4
Phragmites australis	common reed	PHAU7
Poa bulbosa	bulbous bluegrass	POBU
Poa pratensis	Kentucky bluegrass	POPR
Pseudoroegneria spicata	bluebunch wheatgrass	PSSP6
Forbs		
Achillea millefolium	common yarrow	ACMI2
Allium acuminatum	tapertip onion	ALAC4
Arabis holboellii	Holboell's rockcress	ARHO2
Artemisia ludoviciana	white sagebrush	ARLU
Astragalus cibarius	browse milkvetch	ASCI2
Astragalus purshii	woollypod milkvetch	ASPU9
Ceratocephala testiculata	curveseed butterwort	CETE5
Chorispora tenella	crossflower	CHTE2
Collinsia parviflora	maiden blue eyed Mary	COPA3
Comandra umbellata	bastard toadflax	COUM
Crepis acuminata	tapertip hawksbeard	CRAC2
Cynoglossum officinale	gypsyflower	CYOF
Delphinium nuttallianum	twolobe larkspur	DENU2
Draba verna	spring draba	DRVE2
Equisetum	horsetail	EQUIS
Equisetum laevigatum	smooth horsetail	EQLA
Fritillaria atropurpurea	spotted fritillary	FRAT
Fritillaria pudica	yellow fritillary	FRPU2
Geranium viscosissimum	sticky purple geranium	GEVI2
Lithophragma glabrum	bulbous woodland-star	LIGL2
Lithospermum ruderale	western stoneseed	LIRU4
Lomatium triternatum	nineleaf biscuitroot	LOTR2
Maianthemum stellatum	starry false lily of the valley	MAST4
Mertensia oblongifolia	oblongleaf bluebells	MEOB
Osmorhiza occidentalis	western sweetroot	OSOC
Penstemon deustus	scabland penstemon	PEDE4
Phlox longifolia	longleaf phlox	PHLO2
Ranunculus glaberrimus var. glaberrimus	sagebrush buttercup	RAGLG
Senecio integerrimus	lambstongue ragwort	SEIN2
Solidago missouriensis	Missouri goldenrod	SOMI2
Taraxacum officinale	common dandelion	TAOF
Viola nuttallii	Nuttall's violet	VINU2
Zigadenus venenosus	meadow deathcamas	ZIVE

Table 23: Gibson Jack Research Natural Area Plant Species List

RNA Establishment Record
(updated 24Nov2009 by Rose Lehman)
Note: Names used are the accepted names as used in the PLANTS Database

Scientific Name	Common Name	Code
Trees		
Abies lasiocarpa	subalpine fir	ABLA
Juniperus osteosperma	Utah juniper	JUOS
Populus	cottonwood	POPUL
Populus tremuloides	quaking aspen	POTR5
Pseudotsuga menziesii	Douglas-fir	PSME
Shrubs		
Acer glabrum	Rocky Mountain maple	ACGL
Acer grandidentatum	bigtooth maple	ACGR3
Amelanchier alnifolia	Saskatoon serviceberry	AMAL2
Amelanchier utahensis	Utah serviceberry	AMUT
Artemisia	sagebrush	ARTEM
Artemisia arbuscula	little sagebrush	ARAR8
Artemisia nova	black sagebrush	ARNO4
Artemisia tridentata	big sagebrush	ARTR2
Artemisia tridentata ssp. vaseyana	mountain big sagebrush	ARTRV
Cercocarpus ledifolius	curl-leaf mountain mahogany	CELE3
Chrysothamnus viscidiflorus	green rabbitbrush	CHVI8
Cornus sericea	redosier dogwood	COSE16
Mahonia repens	creeping barberry	MARE11
Opuntia polyacantha	plains pricklypear	OPPO
Pyrola	wintergreen	PYROL
Ribes	currant	RIBES
Ribes viscosissimum	sticky currant	RIVI3
Rosa	rose	ROSA5
Rubus parviflorus	thimbleberry	RUPA
Symphoricarpos oreophilus	mountain snowberry	SYOR2
Tetradymia canescens	spineless horsebrush	TECA2
Graminoids		
Achnatherum lettermanii	Letterman's needlegrass	ACLE9
Bromus arvensis	field brome	*BRAR5*
Bromus tectorum	cheatgrass	*BRTE*
Carex spp.	Sedges	*CAREX*
Carex utriculata	bladder sedge	*CAUT*
Carex amplifolia	big-leaved sedge	*CAAM*
Calamagrostis rubescens	pinegrass	*CARU*
Elymus lanceolatus	thickspike wheatgrass	*ELLA3*
Leymus cinereus	basin wildrye	*LECI4*
Melica bulbosa	oniongrass	*MEBU*
Poa secunda	Sandberg bluegrass	*POSE*
Pseudoroegneria spicata	bluebunch wheatgrass	*PSSP6*

Forbs		
Achillea millefolium	common yarrow	ACMI2
Allium acuminatum	tapertip onion	ALAC4
Arenaria congesta	ballhead sandwort	ARCO5
Arnica cordifolia	heartleaf arnica	ARCO9
Artemisia ludoviciana	white sagebrush	ARLU
Astragalus cibarius	browse milkvetch	ASCI2
Astragalus purshii	woollypod milkvetch	ASPU9
Balsamorhiza sagittata	arrowleaf balsamroot	BASA3
Castilleja angustifolia	northwestern Indian paintbrush	CAAN7
Claytonia perfoliata ssp. perfoliata	miner's lettuce	CLPEP
Collomia grandiflora	grand collomia	COGR4
Crepis acuminata	tapertip hawksbeard	CRAC2
Crepis modocensis	Modoc hawksbeard	CRMO4
Cryptantha	cryptantha	CRYPT
Cynoglossum officinale	gypsyflower	CYOF
Descurainia incana	mountain tansymustard	DEIN5
Descurainia pinnata	western tansymustard	DEPI
Erigeron pumilus	shaggy fleabane	ERPU2
Eriogonum heracleoides	parsnipflower buckwheat	ERHE2
Eriogonum umbellatum	sulphur-flower buckwheat	ERUM
Fragaria vesca	woodland strawberry	FRVE
Fritillaria atropurpurea	spotted fritillary	FRAT
Fritillaria pudica	yellow fritillary	FRPU2
Galium aparine	stickywilly	GAAP2
Galium trifidum	threepetal bedstraw	GATR2
Geranium viscosissimum	sticky purple geranium	GEVI2
Hackelia patens	spotted stickseed	HAPA
Helianthella uniflora	oneflower helianthella	HEUN
Hieracium albiflorum	white hawkweed	HIAL2
Hydrophyllum capitatum	ballhead waterleaf	HYCA4
Lithophragma glabrum	bulbous woodland-star	LIGL2
Lithospermum ruderale	western stoneseed	LIRU4
Lomatium grayi	Gray's biscuitroot	LOGR
Lupinus caudatus	tailcup lupine	LUCA
Lupinus sericeus	silky lupine	LUSE4
Maianthemum racemosum	feathery false lily of the valley	MARA7
Mertensia ciliata	tall fringed bluebells	MECI3
Microseris nutans	nodding microceris	MINU
Mimulus moschatus	muskflower	MIMO3
Mitella stauropetala	smallflower miterwort	MIST3
Nemophila	baby blue eyes	NEMOP
Nothocalais troximoides	weevil prairie-dandelion	NOTR2
Osmorhiza	sweetroot	OSMOR
Osmorhiza berteroi	sweetcicely	OSBE
Paeonia brownii	Brown's peony	PABR
Paxistima myrsinites	Oregon boxleaf	PAMY

Penstemon	beardtongue	PENST
Penstemon attenuatus var. militaris	South Idaho penstemon	PEATM2
Penstemon humilis	low beardtongue	PEHU
Penstemon perpulcher	Minidoka beardtongue	PEPE12
Perideridia gairdneri	Gardner's yampah	PEGA3
Phlox longifolia	longleaf phlox	PHLO2
Potentilla	cinquefoil	POTEN
Potentilla glandulosa	sticky cinquefoil	POGL9
Pteridium aquilinum	western brackenfern	PTAQ
Rudbeckia occidentalis	western coneflower	RUOC2
Sedum debile	orpine stonecrop	SEDE
Senecio	ragwort	SENEC
Senecio integerrimus	lambstongue ragwort	SEIN2
Senecio serra	tall ragwort	SESE2
Silene	catchfly	SILEN
Stenotus acaulis	stemless mock goldenweed	STAC
Thalictrum fendleri	Fendler's meadow-rue	THFE
Tragopogon dubius	yellow salsify	TRDU
Urtica dioica	stinging nettle	URDI
Valeriana occidentalis	western valerian	VAOC2
Viola adunca	hookedspur violet	VIAD
Viola purpurea	goosefoot violet	VIPU4
Wyethia amplexicaulis	mule-ears	WYAM

Fire

Fire has played a small role in the ecological disturbance of the analysis area since the practice of fire exclusion has been the rule. Although there have been wildfires, most of them have been kept relatively small due to active fire suppression. This has led to a build up of fuels and is setting the stage for high intensity, stand replacing wildfires.

Historical fire return intervals for this area are in the range of 26-71 years (Barrett 1994) however, fires have been suppressed for many years. Because stands are scattered and difficult to access, this condition is likely to persist. Treatment opportunities center on prescribed burns and limited vegetation treatment where access is more easily obtained.

Most of the shrub lands are also in late seral stages. Consequently there are potential risks of large fires, insects and disease outbreaks. These risks may be limited by the scattered nature of the stands. Fire suppression has increased fuel loading to abnormally high concentrations. Prescribed fire and some vegetation manipulation could be used in the subsections of the analysis area where access permits to help restore and maintain a healthy ecosystem.

Several areas have already been treated with good results. Wild Horse Mountain, which is Portneuf West Bench units 23-26, was burned in 2007. These were sage and mountain shrub communities that prior to the burn had an average canopy cover of 57 percent. After the burn the average canopy cover was down to around 18 percent. Another area

that was successfully treated with prescribed fire is Mud Springs, which is just south of Wild Horse. Before the burn this sage and mountain shrub community had an average canopy cover of 27 percent, and after the burn the average canopy cover was 13 percent.

Forest structure can be divided into four aspects; age structure, species composition, mosaic patterns, and vertical structure or ladder fuels (Kilgor 1981). Each of these aspects can, and in most cases, has been modified by fire exclusion. The effects fire suppression has on the structure of the forest directly impacts wildfire, hydrologic function, insects, pathogens and aquatic organisms.

Research in the Selway-Bitterroot Wilderness Area (Arno, Barrett 1991) developed the concept of "fire regimes". Barrett and Arno found that each vegetative community responds to fire, or lack of fire, in similar ways. Habitat types have been grouped together by similar response patterns into the widely accepted fire regimes. A fire regime describes a plant community's expected response to fire. In general terms, fire regimes give us a description of the type of fire effects that can be expected for different layers of the forest vegetation.

Stand replacement fire, in which the majority of trees are killed, tend to favor seral species while low intensity mixed severity fire would favor shade tolerant species.

Each fire regime entails three different descriptors:

1. Fire type and severity (i.e. lethal, non-lethal, mixed-severity).

2. Frequency of return interval (frequent, non-frequent).

3. Burn pattern (mosaic, uniform).

The two regimes within the analysis area are described separately:

Douglas-fir/Subalpine Fir Fire Regime: This regime occurs on cool, moist northerly aspect, usually at higher elevations (5000 ft and greater). Due to the high elevation and lower energy aspects, these sites generally do not dry out until later in the summer. Uniform, stand replacement fires are typical. However, a mosaic pattern leaving stands or whole groups of live trees often occurs. These stands are a result of fuel accumulations and much continuous ladder fuels over 190 year intervals (Barrett 1994). Mature stands have higher fuel accumulations and much continuous ladder fuel within the stand structure. Fires, once started, produce higher intensities resulting in higher tree mortalities mainly as a stand replacement event.

Quaking Aspen Fire Regime: Quaking aspen is the most widely distributed native North America tree species (Little 1971 and Sargent 1890). It grows in a great diversity of regions, environments, and communities. Aspen is a component of several vegetation types within the Lower Portneuf Analysis Area. It grows in a broad range of elevations from 5500 feet to 8000 feet. Due to climatic conditions throughout the analysis area, the

aspen sites rarely have an opportunity to burn naturally. Prescribed burning in the Blind Springs area has been attempted in the fall of 2008 and again in the spring of 2009 with marginal results.

The combination of dry weather and cured fuels within the aspen forest does not occur every year. Most frequently, it occurs in the fall, sometimes in late summer, and occasionally in spring. Late September and October can be wet, but often have periods of dry, sunny weather. At this time the herbaceous under story has frozen and is dead, but still largely upright, and can burn readily. The aspen canopy also loses its leaves in late September and October. If conditions continue to dry, layers of continuous loosely packed fine fuels develop, making the aspen more flammable. Most years however, aspen leaf-fall and the first heavy wet snow of the fall coincide in much of the aspen range.

Uniform stand replacement fires are not typical for this regime. However, a mosaic burn pattern leaving stands or whole groups of live trees often occurs. More often, the result is that the perimeter of the aspen stand is burned due to grass, mountain brush, and sagebrush edge effect.

Soil moisture within the stand can also decrease the ability for fir to burn through a forest stand. Although aspen does not burn readily, aspen trees are extremely sensitive to fire because of their thin bark. Despite the difficulty of getting fire to burn through aspen stands, the very sensitivity of the species, especially that of young trees, makes prescribed fire a viable tool for regeneration aspen.

A fire intense enough to kill the aspen overstory stimulates abundant suckering. However, some suckering occurs after any fire disturbance. Low to moderate fire intensity will reduce the fuel load on the ground but may not be hot enough to remove the overstory in the stand.

Aspen require a maintenance level of disturbance such as fire, a wind event strong enough to uproot the trees, or mechanical treatment to assure regeneration of the stand. Without such an event, aspen is displaced by conifers, shrubs, and or grass. Once the invasion of conifers starts, aspen are outcompeted by the conifers for moisture and sunlight and the aspen begins to die. This successional process is partially offset by aspen dominating an area where fire, insects, or cutting has removed conifer stands. Stephen W. Barrett suggests the following fire frequency intervals in conifer-aspen stands to have a range from 16 to 97 years and the average mean fire interval of 45 years (Barrett 1994).

RANGE

Livestock Grazing

Suitability and capability of the landscape to support livestock was evaluated in the FEIS for the Revised Forest Plan 2003. Capability of the rangeland to support grazing animals is determined by vegetation type, slope, soil productivity, vegetation production and, access to water. Suitability of the rangeland to support grazing animals is the integration of capability and the appropriateness of grazing an area of land considering social and economic concerns and compatibility with other land uses (FEIS IV 2003).

Table 24, outlines the number of Animal Unit Months (AUM's) each allotment is capable /suitable of supporting using the above criteria. The actual permitted AUM's area also shown to indicate the difference in what is currently being run in each allotment and what each allotment should be capable of supporting. The number of livestock grazed within each allotment has been declining since the creation of the Forest.

Table 34: Capable/Suitable AUM's by Allotment

ALLOTMENT	CAPABLE/SUITABLE AUM'S	PERMITTED AUM'S 2009
Midnight C&H	1636	692
Michaud C&H	587	420
Pocatello C&H	5889	5192
Birch Creek S&G	2601	700 every other year
Old Tom S&G	2159	700 every other year

Ground Cover

To evaluate current conditions within the analysis area, ground cover values were used as an indicator of rangeland health (RMSRS-GTR-104, 2003). Parker 3-step and nested frequency transects were reread in 2009 to determine the change over time. Table 25 illustrates ground cover data collected over time at different monitoring locations. Initial data were collected in the past using the Parker 3-step method. In 1996 two of the Parker 3-step transects were found and data collected using the nested frequency method. In 2009, data was collected on both these nested frequency and other Parker 3 step transects using a Daubenmire frame on a 100 foot transect.

Table 25: Upland Monitoring Data Showing Bare Ground Values

STUDY & LOCATION	HABITAT TYPE	STUDY DATE	BARE GROUND	STUDY DATE	BARE GROUND	STUDY DATE	BARE GROUND	STUDY DATE	BARE GROUND	STUDY DATE	BARE GROUND	STUDY DATE	BARE GROUND
E. Fork Mink Creek #C-507	Sagebrush/ Grass	9-3-09	9%	8-1-78	26%	10-1-69	4%	8-13-64	15.5%	8-6-59	30.5%	8-6-54	19.5%
Bull Canyon NF	Sagebrush/ Grass	7-30-09	2.45%	7-17-96	4.8%	10-2-69	22%	8-16-63	32.5%	6-24-57	22.5%		
Two Mile Creek # C5-15	Sagebrush/ Grass	8-5-09	13%	8-9-78	11.5%	8-2-67	32%	8-3-61	29%	8-10-56	19%		
Rowe/Lost Creek # C5-35	Sagebrush/ Grass	8-11-09	4%	8-7-78	18%	8-5-65	29%						
Old Tom # C5-28	Sagebrush/ Grass	8-11-09	4%	8-15-78	28%	8-14-64	12%						
Buckskin Basin # C5-44	Sagebrush/ Grass	8-3109	10%	8-24-78	23%	8-24-65	11.5%						
Beach Hollow # C5-48	Sagebrush/ Grass	7-13-09	17%	8-28-78	39%	8-30-65	19%						
Clifton Creek NF	Unknown	7-21-09	10.55%	7-18-96	13.4%								
Trail Creek # C5-30	Sagebrush/ Grass	8-12-09	12%	8-3-65	16%								

Three noxious weed species were identified in the 1998 GIS mapping project as occurring within the analysis area and occupying an estimated 453 acres, (GIS Corporate Data Reference Library, 1998) <1% of the 64,457 acres of FS land within the analysis area, ranging in density from low (few scattered plants usually over a relatively large area) to dense (many plants generally restricted to small areas). If noxious weed species are found on a site, the site is considered to be "at-risk". Table 26 lists those weeds and the acres associated with each species.

Table 26: Weed Acres by Species

SPECIES	ACRES
Canada thistle	307
Musk thistle	107
Poison hemlock	39
Total acres	**453**

The desired mix of cover classes for sustainable sagebrush ecosystems (RMRS –GTR-104 p. 3) includes: 10 percent in low canopy cover; 50 percent in moderate canopy cover; and 15 percent in heavy canopy cover. Based on vegetation coverage prepared by Prevedel (2003), total sagebrush cover types made up 18,004.8 acres within the Portneuf watershed. Of those acres, 16% were in the low canopy cover class, 55% were in the moderate canopy cover class, and 29 % were in the heavy canopy cover class (see table 27). These percentages exceed the desired mix of cover classes for sustaining sagebrush ecosystems.

Table 27 Prevadell Sagebrush Cover

PREVADELL COVER TYPE	ACRES	CANOPY	PERCENTAGE	DESIRED COVER
10_ARTRV_LOW	2870.9	1-10%	16%	10%
9_ARTRV_MODERATE	9938.2	11-20		
44_ARTRTR_MODERATE	6	11-20%	55%	50%
8_ARTRV_HEAVY	5186.8	21-30 +%		
43_ARTRTR_HEAVY	2.9	21-30+%	29%	15%
TOTAL ACRES	18004.9			

Species Composition

Mountain and Basin big sagebrush communities (SRM-401 & 402) as detailed in Rangeland Cover Types of the United States should have a grass component of 40-50% and a forb component ranging from 20-25%. The upland DMA sites established in the 1950's and 1960's were all classified as sagebrush grass communities (most likely made up of big sagebrush communities). Those sites were re-monitored in 2009, table 28 shows the grass and forb composition of those sites in 2009.

Table 28: Grass and forb composition per study site.

Study Site	Date	Grass Composition	Forb Composition
Old Tom C528	8/11/2009	16%	15%
Rowe/Lost Crk C535	8/11/2009	46%	19%
E. Mink Crk C507	9/3/2009	27%	20%
Harkness C515	8/5/2009	7%	24%
Trail Creek C530	8/12/2009	34%	2%
Beach Hollow C548	7/13/2009	8.4	5.57%
Buckskin Basin C544	8/31/2009	34%	27%
Bull Canyon	7/30/2009	41%	39%
Clifton Pond	7/21/2009	47.5%	12.5%

FISH

Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek Watersheds

The occurrence of Yellowstone cutthroat trout in the Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek watersheds is relatively high with isolated and segmented populations occurring in headwater tributaries and specific main-stem river stretches. Meyer and Lamansky (2004) assessed the composition of the Portneuf River GMU (Portneuf Subbasin) salmonid community in 2000-2001 and determined that 92% of the sites where fish were present contained Yellowstone cutthroat trout, but 53% also contained either rainbow trout or brown trout or brook trout. Of most concern is that 45% of these sites contain a rainbow and/or hybrid component. Salmonid Assemblages with the main-stem Portneuf and Marsh Creek were also analyzed by IDEQ (2009) and related that the distribution and abundance of fish corresponded with local hydrologic conditions. Salmonids made up lower portion of the Portneuf River fish community downstream of the Portneuf Marsh Valley Canal (above McCammon) even though cool water fish predominate and were again abundant in the lower Portneuf River were springs are common. In Marsh Creek fish were not present at two sampling locations in 2007.

Since 2000, only sterile (triploid) rainbow trout have been stocked in the analysis area. According to Idaho Department of Fish Game online stocking database records, only the lower Portneuf, Marsh Creek, and Mink Creek are currently stocked (IDFG 2009).

In 2000 and 2001 K. Meyer sampled tributaries in the Lower Portneuf River, Garden Creek, and Marsh Creek watersheds as part of the baseline fisheries sampling for the Assessment of Native Salmonids Above Hells Canyon Dam, Idaho. Results from the surveys indicated that tributaries within the Garden Creek-Marsh Creek watershed including Bell Marsh, Goodenough, and Walker creeks contained 100% Yellowstone cutthroat trout. In Birch Creek the surveyors only encountered dace and sculpin. Sampling of the main-stem of Marsh Creek above Inkom and near Arimo produced only 1 cutthroat and mostly non game species such as Utah suckers, Utah chub, redside shiners, speckled dace, and sculpin. In contrast the Lower Portneuf River tributaries all contained a high percentage (63-97%) of YCT in the sample, but also had some portion of non-native trout. At one sampling location of Mink Creek, hybrids were encountered. In three sampling locations in the West Fork Mink, a single brown trout was captured. Of most surprise was the high amount of non-natives present in lower Gibson Jack Creek. A total of 39 Yellowstone cutthroat, 5 rainbows, 8 hybrids, and 10 brook trout were captured. No fish were captured in City, Trail, Valve House Draw, or South Fork Mink creeks. As for the Lower Portneuf River, Meyer sampled two sections that contrast the fisheries productivity above and below the Marsh Creek confluence. The Portneuf River site downstream from Inkom and below the Marsh Creek confluence (sample section length 2554m) resulted in the capture of 56 browns, 2 cutthroat, and two hybrid trout while the section between Inkom and McCammon (sample section length 1280m)

resulted in the capture of 366 browns, 4 cutthroat, and 1 hybrid trout (Meyer and Lamansky 2004).

The 2005 Caribou-Targhee National Forest Aquatic Organism Passage (AOP) Survey Crew performed 14 partial and 2 full surveys on crossings within the Lower Portneuf River watershed and 3 partial and 1 full surveys in the Garden Creek-Marsh Creek watershed to determine the ability of culverts to pass upstream-migrating aquatic organisms. In these surveys, all three full surveys identified passage barriers that limited movement of both juvenile and adult salmonids. These passage barriers were located on Mink, East Fork Mink, and Goodenough creeks. The main-stem Mink Creek crossing was located at the Slate Mountain Trailhead (FS515-015) and fish passage was restored in 2007 with the relocation of the trailhead and installation of a new trail bridge. This culvert blocked over 9 miles of upstream habitat for Yellowstone cutthroat trout. Brown trout are also common in Mink Creek and had already colonized above this crossing prior to restoration of this site. All future passage projects within the Mink Creek drainage will need to consider the potential for expansion and colonization of brown trout before implementation. Crossings on the East Fork Mink (FS524-0.1) and Goodenough creeks (FS541-2.90) are in need of replacement to benefit watershed health and improve fish passage for YCT. The East Fork Mink Creek crossing is located 0.1 mile up FS Road 524 and blocks an estimated 4.6 miles of headwater habitat. The Goodenough Creek crossing is located on FS Road 541 on BLM administered land located just below the Goodenough Creek campground. This crossing fragments over 2 miles of headwater habitat in Goodenough Creek (Lyman 2005).

Portneuf River

In 1994 IDFG purchased a 17.4 ha plot on the Portneuf River south of Pocatello to establish the Edson Fichter Nature Area. Plans for the nature area included establishing a put-and–take trout fishery within this reach of the Portneuf River. In 1995 IDFG personnel established a stream temperature study to determine if this reach could support such as fishery (Scully and Mende 1996). Summer stream temperatures in this reach of the Portneuf were found to be above temperature regimes required (frequent daily maximum temperatures of 21-22°C) to support a healthy trout population. In September of 2007 ISU sampled two reaches within the Nature Area. The majority of fish captured were speckled dace, longnose dace, and redside shiners (combined 87% of catch). Two trout (rainbow and brown trout) along with low amounts of Utah Suckers, mottled sculpin, and Paiute sculpin were also encountered (IDEQ 2009).

In October of 2007 ISU also sampled the lower Portneuf River at Batiste Road where spring influences create a gaining reach. At this location approximately 75% of the catch was salmonids, including in the total catch, 19% YCT, 34% rainbow trout, 6% hybrids, and 17% mountain white fish. Other fish present included redside shiner, and some common carp and Utah chub (IDEQ 2009).

Starting in 1999, Hunter Osborne, Resident Fisheries Biologist for the Shoshone Bannock Tribe has been conducting fisheries sampling within the Lower Portneuf River watershed.

Over the last decade he has located Yellowstone cutthroat trout in the lower spring dominated reach of the Portneuf River within tribal lands. Past surveys indicate that adfluvial fish are using this reach for spawning. Currently introgression with rainbow trout (hybridization) and competition with non-native trout are limiting YCT abundance and distribution in the Lower Portneuf River (Osborne 2009).

In 2009 the Idaho Department of Environmental Quality released the Portneuf River Subbasin Biological Assessment (IDEQ 2009) that summarized a marcoinvertebrate assemblage study conducted by Hopkins in 2004 on the Portneuf River. This study repeated study sites that were sampled almost 40 years earlier by Minshall and Andrews. Results from the 2004 survey indicated that 167 marcoinvertebrate taxa were identified in the main-stem Portneuf River. The abundant taxa in 2004 were the exotic New Zealand mudsnail (*Potamopyrgus antipodarum*). The mudsnail was found at all sampling sites and was abundant in reaches with large spring influences.

City Creek

City Creek was surveyed by the Forest Fisheries Crew in June 2001. No fish were captured during the survey. One reach with two units, approximately a half mile long was located on Forest and state lands. The stream was described as small, with an average depth of 0.032 meters and a Rosgen channel type as C3. The dominant riparian vegetation was red-osier dogwood, big tooth maple, rocky mountain maple, water birch, alder, and aspen in the lower two units and Douglas fir and aspen in the upper unit. The riparian understory consisted of mostly yarrow, snakeweed, horsetail, ferns, rose, sedges, and grasses. In the headwaters, City Creek contains favorable canopy cover, bank stability, and substrate composition. Stream substrate consisted of mostly cobble-gravel mix with low amounts of fine sediment. Large woody debris was frequent in the stream channel. On the Forest, there are no roads and signs of grazing were not found. Pfankuch stream channel stability was rated as fair. Below the Forest a popular trail follows the stream. During the survey an older gentleman stopped the crew and mentioned in passing that this year was the lowest water year that he had seen in over 20 years of frequenting the trail. Recommendations from the inventory included maintaining the current condition of the habitat as well as sampling in a better water year to see if fish populations expand in this stream (USFS 2001).

City Creek enters the Portneuf River just as the rip-rap lined ditch transitions into a concrete lined flume. The tributary near the mouth is also concrete lined and enters the main-stem at perched elevation. For over 35 years fish passage into City Creek has been blocked at the confluence with the Portneuf River.

In 2008 M.J. Walker, an ISU undergraduate, conducted a paired watershed study that compared recreational impacts and recreational management to changes in City and Gibson Jack creeks. During the study, stream sediment, *E coli*, stream macroinvertebrate community structure, leaf litter decay rates, and amounts of dissolved organic carbon were analyzed. Results from the survey indicated that higher amounts of recreational use in City Creek may be limiting stream structure and function. City Creek had higher levels

of suspended sediment, substrate embeddedness, *E coli* concentrations, and dissolved organic carbon. It was also determined that City Creek had lower rates of litter decay and diversity of stream invertebrates. City Creek contained low amounts of stream organisms that are indicators of high water quality (*Ephemeroptera*, *Plecopetera*, and *Tricoptera*) and higher amounts of sediment tolerant invertebrates (Annelids) (Walker et al 2008).

Gibson Jack Creek

The Forest Fisheries Crew performed a fish distribution survey on Gibson Jack Creek in 2001. The survey started at the Forest boundary and ended 3 miles upstream at the headwaters of the North Fork. The stream was broken out into three reaches with five units each. Yellowstone cutthroat trout ranging in size from 60-240 mm were found in low densities throughout the stream. Reach 1 yielded 28 YCT, Reach 2 yielded 43 YCT, and Reach 3 had 13 YCT. In addition, a total of 73 sculpin were captured in the lower two reaches. The Rosgen channel type was described as a mix of B-2/3 and C-3 for all units. Dominant streamside vegetation included red-osier dogwood, water birch, coyote willow, Douglas fir, and chokecherry. The understory was mostly currant, horsetail thistle, sedges, and grasses. Gibson Jack Creek had favorable canopy cover, stream bank stability, and stream substrate composition throughout all reaches. Amounts of fine sediment were low and spawning gravels were abundant. Most stream banks encountered were stable with low amounts of erosion. The riparian vegetation was thick and mature and provided good root mass for bank stability, shade, and contributes large woody debris. Large woody debris was abundant in the stream channel. The upper two-thirds of Gibson Jack Creek are located in the Research Natural Area (RNA). A trail follows and crosses the stream in several locations, but the location of the trail and the healthy riparian buffer were seen to mitigate any potential sediment inputs. Pfankuch stream channel stability was rated as good for all reaches (USFS 2001).

In 2003, Yelton with IDFG sampled two sections of Gibson Jack Creek and captured 11 cutthroats, 1 brown, 3 brook trout, and sculpin in the lower unit and 6 cutthroat and several sculpin in the upper unit (IDFG 2006).

Indian Creek

The Forest Fisheries Crew performed a fish distribution survey on Indian Creek in June of 2001. The surveyors started the reach at the Forest boundary where the stream was found to be dry. Livestock impacts to the stream corridor were heavy above and below the Forest boundary. It was also noted that the stream had water below the Forest boundary. Recommendations from the inventory included addressing livestock impacts and re-sampling the stream for fish distribution on a wetter year (USFS 2001).

Mink Creek

In the late 1980's Mink Creek in the vicinity of the Bannock Guard Station was straightened and ditched along the western slope of the valley to make room for a horse pasture. In the summer of 2008 District Ranger G. Tower further compromised the

stream riparian area by filling in an emergent wetland to create a new boneyard. Currently the Mink Creek stream corridor associated with the Bannock Guard Station is devoid of a mature canopy and the stream is relatively straight.

In 1997 the Westside Ranger District put together a five year fisheries and wildlife action plan that proposed modifying a culvert crossing in the Cherry Springs Nature Area that was potentially a fish passage barrier (Tower 1997). In 2008, Forest recreation, hydrology, fisheries, and engineering staff toured the Mink Creek drainage looking at fish passage and travel corridor improvement needs. While touring the paved trail network in the Nature Area Deb Tiller, recreation staff, related that this area was once an organized campground located on the river and that some of the road crossing structures were present. During the tour we identified two culvert crossings that were perched, increasing channel scour, and impeding fish passage. It was recommended by the group to replace these structures with trail bridges. To date, no restoration actions have taken place at this location.

In June of 1991, the Idaho Department of Fish and Game (1991) established four fish and habitat sampling locations on Mink Creek. The first site (Site A) was located in lower Mink Creek near the Frazier's egg farm. At this location 3 cutthroat trout were captured in a 99m section that consisted of mostly fast water habitat (runs) and a substrate mix of sand, gravel and cobble. The second site (Site B) was located at the Forest boundary. At this location 2 cutthroat trout were captured in a section that consisted of fast water habitats (runs and riffles) with a substrate composition of sand, gravels, cobble and boulders. The third site (Site C) was located above the Slate Mountain Trailhead culvert (fish passage barrier). At this location, 7 brown trout and 1 cutthroat trout were captured in a 115m section that consisted of all fast water habitats (runs) with a substrate composition of mostly sand and some gravels. The fourth site (Site D) was located above the box culvert and the Valve House. At this location, 3 brown trout were captured in a 141m section that consisted of mostly fast water habitats (runs and riffles) and a substrate composition of mostly sand, gravels and cobbles.

In 2000, the Idaho Department of Fish and Game (2000) repeated the fish and habitat surveys on 4 locations of Mink Creek. At the first site (Site A) 58 brown trout, 3 cutthroat trout, and 48 sculpin were captured in a 119m section that consisted of moderate canopy cover (20-100%) and stability (10-100%) with low amounts of undercut banks and substrate mix of sand, gravel and cobble. At the second site (Site B) 39 brown trout, 4 hybrids, 2 cutthroat trout, and 2 sculpin were captured in a 180m section that consisted of good canopy cover (40-100%) and stability (40-100%) with moderate amounts of undercut banks and substrate composition of mostly sand with gravels and some cobble and boulders. At the third site (Site C) 21 brown trout, 14 cutthroat trout, 5 hybrids, and 9 sculpin were captured in a 55m section that consisted of moderate canopy cover (30-95%), high stream bank stability (70-90%), low amounts of undercut banks and substrate composition of mostly sand. Habitat types were also listed as all pools and runs. Although not noted, this section of stream is commonly occupied by beaver. At the fourth site (Site D), 12 cutthroat trout and 34 sculpin were captured in a 89m section that consisted of moderate canopy cover (5-100%), moderate stream bank stability (5-100%),

moderate amounts of undercut banks and a substrate composition of mostly sand with some gravels.

In 2001 the Forest Fish Distribution Crew conducted a fish distribution survey on Mink Creek. Starting in mid-June, the Fish Distribution Crew established 3 sampling reaches in Mink Creek starting at the Forest boundary and ending at the confluence with the South Fork. Results from the survey found that brown trout were the most common trout captured (78%) followed by Yellowstone cutthroat trout (21%), and rainbows and hybrids (<1% combined). Brown trout were found in high densities in Reaches 1 and 2 and only one specimen was captured in Reach 3. The Rosgen channel type was described as mix of C-2/3/4 for all units. Dominant streamside vegetation included red-osier dogwood, water birch, coyote willow, Douglas fir, aspen, and chokecherry. The understory was mostly currant, horsetail, thistle, geranium, sedges, and grasses. The quality of canopy cover, stream bank stability, and stream substrate composition varied throughout all reaches. Reaches 1 and 2 had great riparian canopy cover, deep water, lower velocities and beaver dams were common. In contrast these reaches also had high amounts of stream bank erosion as well as accumulated sediments in beaver dams. Reach 3 had more gravels, cobbles, and boulder substrate than the previous two reaches but also had more significant recreational and livestock impacts. Pfankuch stream channel stability was rated as fair for all reaches. Recommendations from the inventory included addressing livestock impacts to stream banks and riparian areas, addressing sources of erosion and fines sediment, and working with IDFG to discontinue stocking catchable rainbow trout (USFS 2001).

In 2001 the Forest Fisheries Crew conducted a R1/R4 Physical Habitat Inventory on Mink Creek. Six reaches covering over 5 miles were inventoried by the crew. Mink Creek has a mix of moderately wide flood plain bounded by steep side slopes with a moderately sinuous stream channel and other areas that have moderately confined valley bottoms with low sinuosity and higher stream gradients. The riparian composition consisted of red-osier dogwood, willow, chokecherry, river birch, cottonwood and Douglas fir. The understory vegetation consisted of geranium, thistle, clover, grass, horsetail, forbs, sedges, and mosses. Estimates of stream canopy cover ranged from 0% to 100%. Stream bank stability was estimated and ranged 50-90% with undercut banks encountered in 3-21% of the stream. Stream substrate composition varied with stream gradient but, in general, was composed of mostly boulders, cobbles and gravels with low amounts of fine sediment throughout the stream corridor. In-stream wood averaged between 0.7-2.1 pieces of LWD per 100 meters with willow and cottonwood as the primary source. Overall the reach was classified as a Rosgen B-3/4/5/6 with mostly low gradient riffles and pools formed from beaver and lateral scour. Stream sinuosity was low to moderate with an average of 1.3-4 pocket pools per 100 meters with an average depth of 0.31-0.43m. Mean stream width was 2.5-3.9m and mean stream depth was 0.14-0.23m.

Comments from the surveyors indicated that Mink Creek had very good habitat and riparian conditions. Mink Creek contained intact riparian vegetation and several beaver colonies that buffered the stream from impacts associated with the road corridor,

recreation, and livestock grazing in the watershed. It was noted that in the lower reaches, recreational fishing access points near Cherry Springs, riparian modifications at home sites, and stream channel scour from peak discharge events have contributed to localized stream bank instability and stream sedimentation. In the upper reaches cattle grazing and dispersed camping were noted as contributing to higher amounts of stream bank erosion and sedimentation. Recommendations from the inventory included improving the trails and bank stability in Cherry Springs Nature Area, promoting beaver colonies within the drainage, and reducing livestock and dispersed recreation sites in the upper part of the drainage (USFS 2001). In August of 2003, New Zealand mudsnails were sampled in the Cherry Springs Nature Area of Mink Creek (USGS 2009).

In 2008 and 2009 C. Lyman and the Forest Fisheries Crew investigated the current distribution of brown trout within the Mink Creek main-stem. In 2008, spot sampling around the Valve House encountered brown trout below, above, and within the West Fork. It was previously thought that the Valve House structure was an effective barrier for upstream migrating fish. In 2009, sampling continued on the main-stem of Mink Creek located above the Valve House up to the confluence with the South Fork Mink. Sampling yielded low brown trout numbers immediately upstream of the Valve House with no cutthroat trout. Further upstream (past the canyon section), where Bannock Highway is on the hill, the stream had multiple beaver ponds. Sampling there found many YCT and a single brown trout. In both years the scour pool below the first fish barrier crossing on the South Fork Mink was also sampled and only contained YCT. To date we do not know what is limiting brown trout expansion in the main-stem Mink Creek (USFS 2009).

In 2009, Brad Higginson (Hydrologist) and C. Lyman (Fisheries Biologist) met with John Sigler with the City of Pocatello to discuss operations and fish passage opportunities at the Valve House and Gibson Jack municipal diversion structures. The City welcomed further discussions and was willing to partner if future fish passage projects were warranted. To date, no decision has been made to correct fish passage at either site.

West Fork Mink Creek

In 1997, the Westside Ranger District developed a five year fisheries and wildlife action plan that proposed completing a pond de-siltation project by means of blasting sediments in beaver ponds in West Mink (Tower 1997). Although it was popularly know by 1997 that the way to address sedimentation was at its source, some of this de-siltation project was carried out anyway in West Mink and Midnight creeks.

In 2001, the Forest Fisheries Crew performed a fish distribution survey on West Fork Mink Creek. The survey started just above the Bannock Hwy crossing and ended 2.25 miles upstream near the headwaters. The stream was broken out into three reaches with five units in the two lower reaches and 2 units in the upper reach. A total of 78 Yellowstone cutthroat trout ranging in size from 80-215mm and one brown trout were captured in 7 of the first 8 units. Three units of Reach 2 and all of Reach 3 were fishless. The Rosgen channel type was described mostly as a C-2/3 with some units as a B-4.

Dominant streamside vegetation included red-osier dogwood, willow, water birch, and Douglas fir. Quaking aspen was common in Reach 3. The understory was mostly clover, horsetail, nettle, sedges and grasses. Active and historic beaver activity was present in all reaches. West Fork Mink Creek is located within a municipal watershed and Research Natural Area (RNA) which contributes to favorable canopy cover, stream bank stability, and stream substrate composition. The riparian vegetation was thick and mature and provided good root mass for bank stability and shade which contributed to low stream temperatures. The stream substrate was primarily cobble and gravel. However, some areas with past beaver activity in Reach 3 had higher amounts of fine sediment. Large woody debris was abundant in all reaches. Pfankuch stream channel stability was rated as good for Reaches 1 and 2 and fair for Reach 3 (USFS 2001).

In 2001 the Forest Fisheries Crew conducted a R1/R4 Physical Habitat Inventory in the West Fork Mink Creek. Two reaches covering 0.9 miles were inventoried by the crew. The West Fork has a mix of moderately wide flood plain bounded by steep side slopes with a moderately sinuous stream channel and other areas that have moderately confined valley bottoms with low sinuosity and higher stream gradients. The riparian composition consisted of red-osier dogwood, willow, cherry, river birch and Douglas fir. The understory vegetation consisted of grass, horsetail, forbs, sedges, and mosses. Estimates of stream canopy cover ranged from 50% to 100%. Stream bank stability was estimated and ranged 89-91%, with undercut banks encountered in 1-13% of the stream. Stream substrate composition varied with stream gradient but in general was composed of mostly gravels and cobbles with low amounts of fine sediment were common throughout the stream corridor. In-stream wood averaged between 2.5-3.2 pieces of LWD per 100 meters. Overall, the reach was classified as a Rosgen B-4/5 with mostly low gradient riffles and pools formed from lateral scour, in-stream LWD and boulders. Stream sinuosity is low with an average of 2.9-3.8 pocket pool per 100 meters. Mean stream width was 1.7-1.8m and mean stream depth was 0.10-0.11m.

Comments from the survey indicated that habitat and riparian within this stream were in very good condition as a result of limited human disturbance and no livestock grazing in the watershed. It was noted that the riparian overstory and understory were so intact and vigorous that it was physically impossible to navigate the stream corridor in some places. The healthy riparian vegetation provides great canopy cover, bank stability, and contributes an abundance of LWD to the stream for microhabitat and pool formation (USFS 2001).

In 2006 David Teuscher, IDFG Regional Fisheries Manager, sampled three sections of the West Fork Mink Creek and captured 8 cutthroat trout and 1 brown trout (IDFG 2006).

East Fork Mink Creek

In 1997, the Westside Ranger District put together a five year fisheries and wildlife action plan that proposed a riparian study on the East Fork Mink Creek to help guide grazing and recreation management. As an antidote to why the study was needed that plan recounts that in 1995, District Ranger Tower and Range Manager Butler met with

State lands representatives to examine the stream and riparian conditions on the state land section. Prior to the 1995 grazing season and the field visit, the Pocatello Cattleman's Association had agreed to rest the lower East Fork Unit to help the land managers evaluate impacts on the land parcel. It was noted that this was likely the first time in over 100 years that this section was rested from livestock grazing. During the summer of 1995, recreational users were given free reign of the state parcel and it was determined that impacts to the stream and riparian areas were the same as in the past (Tower 1997).

In 2001, the Forest Fisheries Crew performed a fish distribution survey on East Fork Mink Creek. The survey started just above the Forest boundary at the Lead Draw confluence and ended 3 miles upstream near the headwaters. The stream was broken out into three reaches with five units in the two lower reaches and 3 units in the upper reach. A total of 33 Yellowstone cutthroat trout (size range 55-150mm), 9 brook trout (size range 85-135mm), and 8 sculpin were captured in Reach 1. In Reach 2 and 3, no fish were captured. The Rosgen channel type was described mostly as a C-3/4 in the lower reach and a transitioned into a B-3 in the upper reaches. Dominant streamside vegetation included red-osier dogwood, hawthorn, willow, water birch, maple, snowberry and Douglas fir. The understory was mostly horsetail, thistle, geranium, sedges and grasses. Active and historic beaver activity was present in all reaches. The quality of canopy cover, bank stability, and substrate composition in the East Fork Mink Creek varied throughout all reaches. Reach 1 had moderate canopy cover with riparian vegetation that was dense and mature and provided good root mass for bank stability. However, in many areas, recreation and grazing impacts were noted as contributing to stream bank erosion and riparian degradation. The state land section, which encompassed the first 3 units, was described as having an extensive amount of recreational damage. Pfankuch stream channel stability was rated as fair for all reaches. Recommendations from the inventory included addressing livestock and recreational impacts, relocating sections of the road corridor out of the riparian, surfacing the road to reduce road related sediment, and working with IDFG to discontinue stocking catchable rainbow trout (USFS 2001).

In 2001 the Forest Fisheries Crew conducted a R1/R4 Physical Habitat Inventory in the East Fork Mink Creek. Three reaches inventoried by the crew covered 4.4 miles. The East Fork had a mix of moderately wide flood plain bounded by steep side slopes with a moderately sinuous stream channel and other areas that had moderately confined valley bottoms with low sinuosity and higher stream gradients. The riparian composition consisted of red-osier dogwood, chokecherry, willows, hawthorn, river birch, maple, and Douglas fir. The understory vegetation consisted of Kentucky bluegrass, sedge, clover, thistle, forbs, and mosses. Estimates of stream canopy cover ranged from 0% to 100%. Stream bank stability was estimated and ranged 69-93% with undercut banks encountered in 1-7% of the reach. Stream substrate composition varied with stream gradient but in general, fine sediment was common throughout the stream corridor. In-stream wood averaged between 3-4.1 pieces of LWD per 100 meters and mostly consisted of willow, birch, fir and cottonwood. Overall, the reach was classified as a Rosgen B-4/5 with low and high gradient riffles and pools formed from in-stream wood, boulders, lateral scour and beaver dams. Stream sinuosity was low and there wass an average of 0-2.4 pocket pools per 100 meters with an average depth of 0.22-0.28m. Mean stream width was 0.3-

1.7m and mean stream depth was 0.01-0.07m.

Comments from the survey indicated that habitat and riparian conditions within this stream have been impacted by livestock grazing, recreation, road and trail crossings, and channelization of the stream corridor. The majority of these impacts were prevalent in the first reach which contained a state lands section and several private residences. Stream bank erosion, stream sedimentation, and riparian disturbance from livestock grazing, dispersed camping, and ORV use were noted as factors contributing to degraded fish habitat. Recommendations from the inventory included improving grazing management and removing dispersed camping sites and ORV use out of the riparian areas (USFS 2001).

In 2009, the Idaho Department of Lands gated and closed all vehicle access into the lower state lands section on the East Fork. In October, Patrick Brown, Area Manager for the IDL received correspondence from a member of a local trail machine club complaining about the closure and the flooding, tree damage, and the boggy mess that beaver are creating (Brown 2009).

South Fork Mink Creek

In 1997, the Westside Ranger District put together a five year fisheries and wildlife action plan that proposed a riparian water-table management project that would entail installing structures to maintain or enhance the water-table in areas of South Fork Mink that beaver have abandoned (Tower 1997).

In 2001 the Forest Fish Distribution Crew conducted a fish distribution survey in the South Fork Mink Creek. Starting in mid-May, the Fish Distribution Crew established 3 sampling reaches in the South Fork and 1 reach in Box Canyon. Results from the survey found that Yellowstone cutthroat trout were found in low densities in the lower 2 reaches of the South Fork, but were absent from the upper South Fork reach (Reach 3) and the Box Canyon reach. The absence of YCT in the upper reaches was attributed to low stream flows and poor habitat conditions. The Rosgen channel type was described mostly as a B-3 and C-3/4 with an A-2 channel type located in the canyon section of Reach 2. Dominant streamside vegetation in Reach 1 and 2 included red-osier dogwood, hawthorn, coyote willow, water birch, chokecherry and small amounts of Douglas fir. Reach 3 was mostly aspen and Douglas fir. The understory was mostly clover, geranium, sedges and grasses.

The quality of canopy cover, bank stability, and substrate composition in South Fork Mink Creek varied throughout all reaches. Reach 1 had good canopy cover with riparian vegetation that was dense and mature and provided good root mass for bank stability. However, in many areas, grazing impacts were noted as contributing to stream bank erosion, riparian degradation, and accumulations of fine sediment. Reach 2 was found to be in much best condition of all reaches and had good canopy cover, high bank stability, active beaver dams, and a good mix of cobble and gravel substrate. However, Reach 2 also contained a stream section with high gradient, limited pools, and several fish passage

barriers. Habitat within Reach 3 was considered in poor condition with high sediment loads and low bank vegetative cover. Impacts to this reach were attributed to cattle use, erosion from ORV trails, and the proximity of forest roads to the stream. Pfankuch stream channel stability was rated as fair for all reaches. Recommendations from the inventory included addressing livestock impacts, closing and rehabilitate dispersed camping sites located in riparian areas, relocating sections of the road corridor out of the riparian, surfacing the road to reduce road related sediment, and working with IDFG to discontinue stocking catchable rainbow trout (USFS 2001).

In 2001, the Forest Fisheries Crew conducted a R1/R4 Physical Habitat Inventory in the South Fork Mink Creek. Six reaches covering 3.8 miles were inventoried by the crew. The South Fork has a mix of moderately wide flood plain bounded by steep side slopes with a moderately sinuous stream channel and other areas that have moderately confined valley bottoms with low sinuosity and higher stream gradients. The riparian composition consisted of red osier dogwood, various willow species, and river birch with some sections of maple and Douglas fir. The understory vegetation consisted of Kentucky bluegrass, sedge, willow, and various forbs, sedges, and mosses. Estimates of stream canopy cover ranged from 0% to 100%. Stream bank stability was estimated and ranged 60-89% with undercut banks encountered in 3- 12% of the reach. Stream substrate composition varied with stream gradient but, in general, fine sediment was common throughout the stream corridor. In-stream wood averaged between 0-1.6 pieces of LWD per 100 meters and mostly consisted of small diameter pieces of willow. Overall the reach was classified as a Rosgen B-3/4/5/6 and C-3/4/5/6 stream types with microhabitats ranging from low gradient riffles, lateral scour pools, and beaver dams. Stream sinuosity is low to high and there is an average of 1.8-5.1 pocket pool per 100 meters with an average depth of 0.12-0.32m. Mean stream width was 1.3-2.3m and mean stream depth was 0.04-0.10m.

Comments from the survey indicated that habitat and riparian conditions within this stream have been impacted by livestock grazing, recreation, and the proximity of the road to the stream corridor. Stream bank erosion from bank trampling and hoof shear, high water temperatures, and overall high levels of fine sediment were noted as factors contributing to degraded fish habitat. It was noted that the forest road contributed a significant amount of sediment to the stream and that this is a popular ORV area with several trail crossings present. Grazing management practices within reaches 5 and 6 were noted as being monitored with several long-term photo points in addition to a riparian exclosure that had documented improvements in riparian condition and stream bank stability. Recommendations from the habitat inventory concluded that road relocation, dust abatement, and fixing road drainage problems could be beneficial. In addition, it was also noted that current grazing practices were inadequate for a stream in this poor condition and that cattle exclusion would allow the stream and riparian area to recover at a faster rate (USFS 2001).

The 2007, Caribou-Targhee National Forest hosted an Aquatic Organism Passage (AOP) Regional Training on South Fork Mink Creek. During the training, the crews conducted a full passage survey at the culvert located near the confluence of the South Fork Mink

and Box Canyon (FS163-2.4), within the Lower Portneuf River watershed. Fish passage for cutthroat trout at this site was rated as Gray or unknown and in need of further hydrologic evaluation to determine passage abilities at this site. This culvert is one of five undersized crossings located on the South Fork Mink Creek and is the fourth crossing as you move up the drainage. Although the other four crossing located on South Fork Mink Creek were not fully inventoried for AOP, all of the crossings have been inspected by an IDT comprised of recreation, hydrology, fisheries, and engineering staff in 2008 and 2009 and all sites are either undersized or contributing to channel instability and are likely inhibiting fish passage. These five culvert crossings fragment over 5 miles of stream habitat on South Fork Mink Creek (Lyman 2007).

In 2006 David Teuscher IDFG Regional Fisheries Manager sampled three locations of the South Fork Mink Creek and, like Meyer and Lamansky in 2000, didn't recover any fish (IDFG 2006).

Marsh Creek

In 1995 IDFG obtained a Section 319 grant that paid for construction of a riparian corridor fence along 4.8km of Marsh Creek on the Arimo Ranch for cattle exclusion. This project also included installing several bioengineering treatments as an experiment as well as implementing a riparian grazing strategy for cattle on the remaining portions of the ranch (Scully et al 1995). After constructing fence around 40% of Marsh Creek on the ranch, IDFG personnel also established four monitoring locations within the 6.4km reach to establish baseline fisheries, habitat, substrate, and temperature dataset for future project effectiveness monitoring (Scully and Mende 1996). Fisheries data revealed that only 2 of the 95 fish sampled were trout (1 cutthroat and 1 brown trout) with the majority of fish as Utah Suckers and some carp and Utah chubs. Substrate sampling found that the majority of this reach was mud (85-99%) with few gravels (1-17%). It was suspected that most of the sediment of his reach originated upstream and the amounts were elevated due to a channel dredging project by Downey and sediment flushes from the Arimo Ditch Company. However, within the reach it was noted that past livestock grazing had influenced the channels morphology, stability, and bed load movement. Current width to depth ratios were high and ranged from 13.1-29.7 and averaged 18, while healthy streams usually contain substantially lower (<10) width to depth ratios. Lastly stream temperatures were also found to be marginal (frequent daily maximum temperatures of 20-21°C) for salmonids.

In 1997 IDFG personnel re-sampled the fish community of Marsh Creek located within the Arimo Ranch project area (Mende et al. 2000). Three 0.8km sampling sections were electrofished in late September. Most of the fish sampled that day were Utah Suckers (66%) followed by redside shiners (17%), Utah chub (10%) and carp (6%). Of the 527 fish collected only 13 salmonids were captured with 6 browns, 4 cutthroat, 2 mountain whitefish, and 1 rainbow trout. It was noted that all trout captured were found in sections of the stream near small spring inputs. Comments regarding habitat included that stream bank stability was improving in the reach but Marsh Creek remains wide, shallow, turbid, and water temperatures are warm.

Idaho Department of Environmental Quality (2003) performed a Beneficial Use Reconnaissance Program survey on lower Marsh Creek in July of 2003. No fish were seen or captured.

Idaho Department of Environmental Quality (2003) performed a Beneficial Use Reconnaissance Program survey on Marsh Creek in mid-August of 2003. They sampled a 100 meters section located 0.5 miles below the confluence with Walker Creek. During the inventory a total of 15 Utah suckers, 3 Utah chub, 14 redside shiners, 23 speckled dace, 1 Carp, 13 Longnose dace, and 22 unidentifiable cyprinids. No salmonids were captured.

In 2007 a total of 103 fish were sampled on lower Marsh Creek by ISU. No trout were collected. Redside shiners and speckled dace were abundant. Low amounts of carp and sculpin were also captured. It was noted that this section of Marsh Creek had a lower average fish biomass and density than was observed in the Portneuf River upstream of the Marsh Creek confluence (IDEQ 2009).

Bell Marsh Creek

The Forest Fisheries Crew performed a fish distribution survey on Bell Marsh Creek in 2001. The survey started at the Forest boundary and ended 2.5 miles upstream at the headwaters where the stream forked and became intermittent. The stream was broken out into two reaches with five units each. Yellowstone cutthroat trout ranging in size from 40-175mm were abundant and the only fish species encountered during the inventory. Reach 1 yielded 122 YCT and Reach 2 had 37 YCT. The Rosgen channel type was described as a B-3 for all units. Dominant streamside vegetation included red-osier dogwood, rocky mountain maple, water birch, Douglas fir and quaking aspen. The understory was mostly currant, horsetail and grasses. Bell Marsh Creek had favorable canopy cover, stream bank stability, and stream substrate composition. Most stream banks encountered were stable with low amounts of erosion. The riparian vegetation was thick and mature and provided good root mass for bank stability and shade which contributes to low stream temperatures. The stream substrate was primarily cobble and gravel with few areas consisting of fine sediment. Large woody debris was abundant in the stream channel. Livestock grazing was also present but doesn't result in any measurable stream or riparian zone disturbance. Pfankuch stream channel stability was rated as fair for both reaches (USFS 2001).

Garden Creek

Idaho Department of Environmental Quality (2000) performed a Beneficial Use Reconnaissance Program survey on lower Garden Creek in 2000. They sampled a 100 meter section located near the community of Robin and below the confluence with Little Gap Creek. In late August, the surveyors collected 3 brook trout, 1 dace, and 87 sculpin.

Goodenough Creek

Ted Kellogg and the Forest Fisheries Crew performed a fish distribution survey on Goodenough Creek in mid August of 1999. The surveyors started the reach at the Forest boundary and sampled five 40 meter units as they proceeded upstream. During the inventory, a total of 18 Yellowstone cutthroat trout were the only fish captured. The fish ranged in size from 70-220 mm. Habitat within the sampling reach was described as a Rosgen B4/G4 channel with moderate amounts of erosion. The lower units had higher amounts of eroding banks likely from periodic flood stage events. There is also evidence of grazing related disturbance, however at the time of the survey, the stream and riparian conditions were in an upward trend. In-stream habitat was mostly composed of long, low gradient riffles and small runs. Average stream width was 1.4-1.8 meters with an average depth of 0.06-0.08 meters. Sinuosity was estimated at greater than 1.2 with stream substrate as a mix of cobble, gravel, and fines. Kellogg's initial evaluation of the stream and fish population suggested that this population of YCT is most likely isolated and in jeopardy due to the low densities of fish encountered. Kellogg suggested that channel morphology (stream size and channel capacity) in conjunction with interrupted stream connectivity limit the streams potential to produce fish. Recommendations from the inventory included improving road drainage and fish passage concerns associated with the road network adjacent to the stream (Kellogg 1999).

Idaho Department of Environmental Quality (2003) performed a Beneficial Use Reconnaissance Program survey on Goodenough Creek in mid August of 2003. They sampled a 100 meters section located near the Forest Service boundary. During the survey, a total of 14 Yellowstone cutthroat trout ranging in size from 40-180 meters were captured.

Mormon Canyon Creek

Ted Kellogg and the Forest Fisheries Crew performed a fish distribution survey on Mormon Canyon Creek in mid August of 1999. The surveyors started the reach at the Forest boundary and sampled three 40 meter units as they proceeded upstream. During the inventory no fish were captured. Habitat within the sampling reach was described as limited due to the small channel size and low amounts of stream discharge. Average stream width was 0.28 meters with an average depth of 0.06 meters. Kellogg suggested that fish could use this drainage during the spring but that stream gradient and suitable fish habitat limit the productivity of this stream (Kellogg 1999).

South Fork Walker Creek

In 2001, the Forest Fisheries Crew performed a fish distribution survey on South Fork Walker Creek. The survey started just above the confluence at the Forest boundary and ended 0.5 miles upstream near the headwaters. The stream was divided into one reach with three units. All units of reach 1 were fishless. The Rosgen channel type was described as a C-5 for all units. Water birch and aspen formed the riparian overstory and the understory was mostly weeds and grasses. Substrate composition, bank stability, and

riparian canopy cover were all very poor in all the sampled and observed areas of the stream. Significant livestock impacts were evident throughout the steam corridor. The stream bottom had sediment accumulation due to stream bank erosion and bank sloughing from cattle grazing. Noxious weeds were also common in these continually disturbed areas. Pfankuch stream channel stability was rated as fair for Reach 1. Recommendations from the inventory included addressing current livestock impacts and their associated long term impacts to the stream corridor (USFS 2001).

Walker Creek

In November of 1999, Lee Mabey (CTNF Fisheries Biologist) and Lee Leffert (retired CTNF Forest Hydrologist) toured the Westside Ranger District looking at riparian and aquatic conditions. During this trip, L. Mabey made notes about the road corridor located in the Aquatic Influence Zone on Walker Creek. He mentioned that at one time the Forest granted a private landowner access to his property during a timber sale using the stream bed and that damage to the stream from the roadway had never been addressed (Mabey 1999).

In 2001, the Forest Fisheries Crew performed a fish distribution survey on Walker Creek. Walker Creek was divided into 3 reaches with the survey starting at the Forest boundary and ending 2.0 miles upstream near the headwaters. During the inventory, a total of 27 Yellowstone cutthroat trout were captured. Walker Creek is considered a Yellowstone cutthroat trout stronghold stream. The Rosgen channel type was described mostly as a C-3/4 in the lower units and B-3/4 in the upper units. Water birch, maple, and Douglas fir formed the riparian overstory in Reach 1, while Reach 2 was primarily sagebrush. The understory was mostly weeds and grasses. Substrate composition and bank stability varied throughout all reaches. In Reach1 bank stability and riparian canopy cover was good but riparian vegetation was significantly impacted by livestock and sediment was noted as accumulating in some areas of the stream. In other parts of Reach 1 gravels and cobbles were common and canopy cover was good. In Reach 2 the amount of canopy cover was low and sagebrush was common. Stream bank stability was reduced due to trail and grazing impacts in some units. Overall, the stream was in good condition with gravel and cobble substrate and some LWD. Pfankuch stream channel stability was rated as fair for all 3 reaches. Recommendations from the inventory included addressing current livestock impacts and relocating sections of the road and trail networks out of the riparian (USFS 2001).

Starting in 1999, Hunter Osborne, Resident Fisheries Biologist for the Shoshone Bannock Tribe has been conducting fisheries sampling within the Lower Bannock Creek drainage. Over the last decade he has located Yellowstone cutthroat trout throughout the drainage within tribal lands. Past surveys have occurred on Bannock, Michaud, Birch, Midnight, and Rattlesnake creeks. Currently habitat degradation from grazing, drought conditions, and introgression with rainbow trout (hybridization) are limiting YCT abundance and distribution in the Lower Bannock Creek watershed (Osborne 2009).

In early October of 2000, K. Meyer sampled five tributaries in the Lower Bannock Creek watershed located north of the Fort hall Indian Reservation. Meyer conducted this baseline fisheries sampling as part of the larger Assessment of Native Salmonids Above Hells Canyon Dam, Idaho. Results from the surveys indicated that Crystal and Midnight creeks had good numbers of Yellowstone cutthroat trout and sculpin with no non-native fish captured. No fish were captured in Rattlesnake Creek (Meyer and Lamansky 2004).

Crystal Creek

A fish survey was conducted on Crystal Creek by the BLM Pocatello Field Office in August of 2000 (BLM 2000). The survey was located approximately 1.5 miles upstream from the Fort Hall Indian Reservation boundary on BLM managed lands. During the survey, 8 Yellowstone cutthroat trout ranging in size from 81-180mm were captured in a 91.5 meter long sampling unit. The average stream width was 2.2 meters with a stream sampling area of 201.3 meters. With a sample of 5 YCT captured >100mm that this stream supports a low population density of catchable YCT with 2 fish per $100m^2$. It was also noted that young of year YCT were moderately abundant and sculpin were present.

The Forest Fish Crew performed a fish distribution survey on Crystal Creek in August of 2001. The surveyors started the reach at the boundary of Fort Hall Indian Reservation on private land. At this location, the stream had very little water and no fish were captured. This site was accessed through tribal land that was heavily grazed with a stream corridor that was highly unstable and composed of mostly upland vegetation. Within the sampling reach the stream was described as a Rosgen C4 channel with an overstory of birch and aspen and an understory composed sedges and grasses. The stream substrate was dominated by small boulders, gravel and fine sediment. Stream banks were damaged by livestock grazing, with low bank stability and high amount of stream sediment. Recommendations from the inventory included sampling in a better water year to see if fish populations expand in this stream (USFS 2001).

Midnight Creek

Midnight Creek was sampled by Taki (Fort Hall Tribal Biologist) in late July of 1993 and he recorded capturing 12 cutthroat trout (IDFG 2006).

In 1997 the Westside Ranger District put together a five year fisheries and wildlife action plan that proposed a continuation of beaver pond de-siltation project and a review of riparian fencing needs in Midnight Creek. In early 1995, two large beaver ponds were blasted on Midnight Creek to reportedly remove sediment (Tower 1997).

A fish survey was conducted on Midnight Creek by the BLM Pocatello Field Office in August of 2000 (BLM 2000). The survey was located approximately 0.5 miles upstream from the Fort Hall Indian Reservation boundary on BLM managed lands. During the survey 9 Yellowstone cutthroat trout ranging in size from 72-179mm were captured in a 98.6 meter long sampling unit. The average stream width was 2.2 meters and approximately 214.7 meters of stream were sampled. With a sample of 6 YCT greater

than 100mm in length, it appears this stream supports a low population density of catchable YCT with 3 fish per 100 m^2. It was also noted that young of year YCT were moderately abundant and sculpin were present.

The Forest Fish Crew performed a fish distribution survey on Midnight Creek in August of 2001. The surveyors started the reach at the boundary of Fort Hall Indian Reservation on private land. At this location, the stream had very little water and no fish were captured. This site was accessed through tribal land that was heavily grazed with a stream corridor that was highly unstable and composed of mostly upland vegetation. Recommendations from the inventory included sampling in a better water year to see if fish populations expand in this stream (USFS 2001).

Corral Springs

The Idaho Department of Environmental Quality has identified some livestock grazing issues in the Corral Springs area. They describe the area, in particularly spring creeks, to be intensively used by livestock. They report aspen regeneration may also be affected by this livestock use. Some thistle infestation was evident in this area too (Personal communication with Mladenka 2009).

WILDLIFE

Sensitive Species

American peregrine falcon (Falco perigrinis anatum): Peregrine falcons nest on tall cliffs (usually below 6000 feet elevation) near streams, rivers or reservoirs, though sites can be several miles from water. The nest is usually a shallow scratched out depression in a cavity high on a large cliff face. There are no known peregrine falcon eyries within the watershed area, but marginal suitable nesting habitat does exist and good hunting habitat exists around riparian areas and water bodies within and around the watershed area.

Bald eagle (Haliaeetus leucocephalus): Winter habitat occurs along the Snake River and American Falls Reservoir at the lower end of the watershed on private land and Indian Reservation lands. Bald eagles are found along large bodies of water and nest in large trees with strong branches to support the weight of their nests. Open water with perch sites and carrion (road kill and wild ungulates) is important winter habitat.

Boreal owl (Aegolius funereus): They nest in tree cavities in mature subalpine fir or Engelmann spruce forests with a high density of large trees and forage on small mammals, birds and insects (Hayward 1994, Groves et al. 1997, 134 and Spahr et al. 1991). Occurrence within the watershed area is unknown but probably extremely rare due to the lack of conifer forest habitat.

Flammulated owl (Otus flammeolus): They are obligate cavity nesters usually in mature Douglas-fir or aspen with open canopies (30-60%) and forage on insects in edge habitat (Hayward 1994, Groves et al. 1997 and Spahr et al. 1991). Flammulated owls reside in the watershed.

Great gray owl (Strix nebulosa): They nest in mature lodgepole pine or subalpine fir forests bordering small openings or meadows. They use nests abandoned by hawks or nests on the tops of broken snags. They prey on voles and mice along edges of clearings (Hayward 1994, Groves et al. 1997, Spahr et al. 1991). Actual occurrence in the watershed is unknown.

Northern goshawk (Accipiter gentilis): They nest in a mature & old-growth aspen and conifer forest stands with closed tree canopies, high density of large trees on slopes <30%. They prey on birds & mammals within forest canopy and adjacent small openings. (Reynolds et al 1991, Groves and others 1997, and Spahr and others 1991). There are several known goshawk nests within the watershed. Trumpeter swan (Cygnus buccinator) winter habitat is found on American Falls reservoir north of the watershed analysis area. A small population was released on the reservoir in hopes of increasing the bird's winter range to improve survival. Suitable habitat is not found on the forest.

Columbian sharp-tailed grouse (Tympanuchus phasianellus columbianus) use shrub-steppe with high structural diversity (Paige and Ritter 1999). Sharp-tailed grouse dancing grounds, nest sites, and brood sites are found in areas containing big sage, arrowleaf balsamroot, bluebunch wheat grass, mountain shrub, and riparian cover types. Grass and forbs are needed for cover (Groves et al. 1997, Spahr et al. 1991). Columbian sharp-tailed grouse inhabit rangeland communities in the 12- to 20-inch precipitation zone. Good nesting and brood rearing habitat has been found on the valley bottoms and rolling foothills usually on private or BLM lands around agriculture lands. Several leks are located on the south end of the watershed analysis area on private and BLM lands. No leks are known on the Forest. Mature stands of aspen, chokecherry, and serviceberry adjacent to the grassland, or in grassland riparian areas provide winter habitat.

Greater sage-grouse (Centrocercus urophasianus) are a sagebrush obligate species and use open sagebrush-grass habitats. Greater sage-grouse are not known to occur within the watershed planning area. The watershed is not within any sage grouse Planning Areas in accordance with the 2006 Idaho Greater Sage-grouse Conservation Plan (IDFG 2006). In March 2010, the U.S. Fish and Wildlife Service reviewed the status of the greater sage-grouse and concluded that Endangered Species Act listing was warranted, but precluded throughout its range. Until further legal action is taken, the sage-grouse will continue to be managed by state agencies.

Three-toed woodpecker (Picoides tridactylus): They are found in northern coniferous and mixed-conifer forests at elevations up to 9,000 feet. They are attracted to areas where there are numerous dead trees due to fire, insect epidemic, blow-down or other die-off. They nest in snags and feed on wood-boring insect larvae usually in subalpine fir, spruce-fir, Douglas fir and lodgepole pine in a variety of successional stages (Groves et al. 1997, Spahr et al. 1991). There are areas within the analysis area where there is tree mortality due to bark beetle activity, however, actual occurrence of this species within the watershed analysis area is unknown.

Gray wolf (Canis lupus): The State of Idaho began wolf management when the wolf was delisted on May 4, 2009 (USFWS 2009). As a sensitive species, the wolf is in the Southern Idaho Wolf Management Data Analysis Unit (Nadeau et al. 2009). There have been no sightings of wolves or packs in the watershed.

Wolverine (Gulo gulo): Wolverine are the largest member of the weasel family, and appear to avoid areas of human activity. More scientific research is needed on this species in the inter-mountain west, but studies in central Idaho indicate that wolverines used slightly higher elevations in the summer, especially whitebark pine, and slightly lower elevations in winter, especially Douglas fir and lodgepole pine (Copeland et al. 2007). This may be a result of following large ungulate prey seasonal shifts. Wolverine is not known to occur within the watershed analysis area, however, a collared individual was documented near the

watershed (Inman 2004). Suitable denning habitat (Ruggiero et. al 1994, USDA 2002) and refugia areas away from human activity are limited to non-existent within the watershed analysis area.

Pygmy rabbit (Brachylagus idahoensis): They are the smallest North American species of lagomorph (rabbits & hares). It is a sagebrush obligate species and seems to have very specific habitat requirements. It prefers dense stands of basin big sagebrush with high percent woody cover growing in deep, loose soils. The only known population in the watershed was located in Trail Creek (Roberts 2003) on the north end of the analysis area.

Spotted bat (Euderma maculatum): They occur in a variety of habitat types including ponderosa pine, desert scrub, pinyon/juniper and agricultural land, however, rocky cliffs with cracks and crevices are critical for roosting during the day. This species is somewhat solitary, but may hibernate in small clusters. They typically roost singly in rock crevices high on steep cliff faces, and may be limited by suitable roost sites. Cracks and crevices ranging in width from 0.8-2.2 inches in limestone or sandstone cliffs are preferred roosting sites. They appear to use the same roost each night during the summer and appear to maintain exclusive foraging areas. Little is known about their winter habits. Spotted bats forage over dry, open, coniferous forests and meadows. They primarily prey on moths, but also are known to eat beetles and other insects. This species is not known to occur within the watershed analysis area. The nearest known range is the Owyhee area in southwestern Idaho, 150 miles from the watershed location.

Townsend's (Western) big-eared bat (Corynorhinus townsendii): They forage in a variety of habitats, including shrub-steppe, grassland, juniper, pine, mixed-conifer, and deciduous forest. They are highly nocturnal, emerging from the roost after sunset and foraging up to 13 km (8 miles) from the day roost. Maternity and hibernation colonies occur exclusively in caves and mine tunnels (Groves et al. 1997, Spahr et al. 1991, Oliver 2000). Western big-eared bat seems to be fairly common in Idaho, but the distribution tends to be strongly correlated with the availability of caves or cave-like roosting habitat. In Idaho, the largest known populations are associated with the lava flows in the southwestern part of the state. The only known mine or cave on the CNF in the watershed, located on the east side of Mink Creek near Porcelain Pot, is a small opening that is partially flooded in spring; it appears to be an adit. Three grated mine adits, located northeast of the watershed, provide habitat for bats. Actual occurrence in the watershed is unknown. Hibernacula have been documented in lava-tube caves on the BLM Shoshone District 90 miles northwest of the watershed and in a couple of caves and abandoned mines in Bear Lake County, 60 miles to the east of the watershed. Within the past few years, this species has also been found in abandoned mines in the south end of the Elkhorn Mountains, 40 miles south of area. Western big-eared bat population limiting factors are considered to be their low reproductive rate, limited availability of roost sites, and human disturbance at roost sites and maternity colonies (Spahr, et al. 1991).

Columbia spotted frog (Rana luteiuentris): Columbia spotted frogs are highly aquatic, almost always associated with surface water. They are found in the littoral zone with emergent grasses and sedges. In summer they can be found some distance from breeding sites, but still associated with moist vegetation (citation). Adult spotted frogs may stay in the same area year-round, or can migrate from a hibernation site in a permanent body of water to a breeding pool, then to a wetland or creek for the summer months, and then back to the hibernation site for winter. Adult spotted frogs prey on a wide variety of invertebrates, whereas, tadpoles eat algae, plant material and organic debris. They breed from March through June, with the female laying egg masses in communal clusters. In Idaho, Columbia spotted frogs can be found in appropriate habitat throughout much of the northern part of the state. The Great Basin population is found in isolated portions of Owyhee and Twin Falls County in southwestern Idaho. Actual occurrence within the watershed analysis area is unknown. However, amphibian surveys conducted in the watershed by Idaho State University in 2008 did not report Columbia spotted frog.

Other Species of Interest

Big game - Mule Deer (Odocoileus hemionus)& Elk (Cervus elaphus): The forest and most of the watershed assessment area is in Elk Management Unit 70. Unit 70 is one of seven units that form the Bannock Zone and one of four in the Mule Deer Analysis Area 20. The concurrent increase in numbers of elk and decrease in mule deer on some winter ranges has raised concerns about possible competition for forage and/or social intolerance. Livestock operators in several areas have complained about increasing elk use of forage on public land grazing allotments and private lands. Mountain lions are the major natural predators of elk in the zone and are judged to be at relatively high levels in most areas. However, expanding populations of elk do not indicate that predation is significantly impacting numbers. Coyotes are quite common but not believed to be a major predator of elk. Black bears exist at extremely low levels within the zone and, therefore, are not an important source of mortality for elk.
Major predators of mule deer in this area include mountain lions, coyotes, and bobcats. Mountain lion and coyote populations may have increased during the last 30 years. It is unknown specifically what impact these changing predator systems are having on mule deer population dynamics, although a multi-year investigation of the impact of manipulating predator populations indicated only small effects. This analysis area represents the least productive habitats in southeastern Idaho for mule deer. Low productivity habitats combined with variable winter conditions likely cause mule deer numbers to vary over time.

Three main vegetation types predominate: sagebrush-grassland, aspen, and conifer. Other variations of these 3 main types that are important to deer include mixed shrub communities, Utah juniper, and curlleaf mahogany.

The current mix of vegetation cover types is a result of intensive grazing by livestock during the early 1900s and ongoing fire suppression efforts. These factors converted what was predominately perennial grass stands into shrublands with depleted or sparse understories. Given that current livestock grazing practices are much more conservative and designed to promote grass, and that the current shrublands are aging, it is believed that the quality of mule deer habitat probably peaked earlier in the twentieth century. The current conversion of aspen to conifer and replacement of mixed shrub and sagebrush communities by juniper probably will reduce habitat suitability for mule deer.

Of particular concern is the encroachment of human activity, either intensive recreational efforts and/or structural developments, in mule deer winter range. Developments from the west side of Pocatello south to Walker Creek in Unit 70 have reduced the potential wintering area for deer. Open habitat types combined with moderate to high road densities and, in some areas unrestricted ATV travel, result in a greater vulnerability of mule deer in this area. However, use of motorized vehicles for hunting is prohibited. For other than hunting, motorized travel on the Caribou National Forest within this area is restricted to designated routes during the snow-free period of the year with the specific purpose of reducing impacts to wildlife habitat and reducing wildlife disturbance. Residential, recreational, and associated development has impacted available deer winter ranges, particularly in Unit 70. These impacts have likely had direct effects on numbers of deer and will be impossible to mitigate. Continued growth of human populations will necessitate the acknowledgment of impacts to wildlife habitat and populations.

Moose (Alces alces): Moose exist within the watershed area in low to moderate densities. They range throughout the watershed, but focus on the riparian bottoms and forage year-round on the willow, dogwood, cottonwood, sedges, grasses and aquatic vegetation.

Beaver (Castor Canadensis): Beaver exist within the watershed area in most, if not all of the major drainages. Presence of beaver in the sub-watershed drainages is largely a function of available forage on the creek or within close proximity. Beavers are herbivore generalists, however, they show strong preferences for particular woody plant species. Within the watershed analysis area, beaver seem to prefer aspen, willow and cottonwood.

Avifauna: There are 243 species of birds that breed in Idaho; of these, 119 migrate to the tropical regions of central and South America (ID PIF 2000). These diverse species of birds use some portion of every habitat type within the watershed area. These species are protected by the MBTA, with additional direction from Executive Order 13186. Direction for habitat protection is provided by the Forest Plan, the Idaho Comprehensive Wildlife Conservation Strategy (IDFG 2005) and the Idaho Partners-in-Flight (PIF) Bird Conservation Plan (ID PIF 2000). The Idaho PIF Bird Conservation Plan designates Riparian,

Non-Riverine Wetlands, Aspen, and Sagebrush as Priority A Habitats for the conservation of birds, and High Elevation Mixed Conifer (Spruce/Fir), Low Elevation Mixed Conifer (Douglas-fir), Juniper / Pinyon Pine / Mountain Mahogany, Mountain Brush / Shrubland, Cedar/Hemlock, Grassland, and Agricultural as Priority B Habitats. Priority C habitats include: lodgepole pine, Alpine, and Cliffs / rock outcrops / talus.

Specific PIF high priority species by habitat within the watershed area include: Hammond's and olive-sided flycatchers, brown creeper (high elevation mixed conifer), ruffed grouse and dusky grouse, sharp-shinned hawk, dusky flycatcher (aspen and mixed conifer), western tanager (riparian & aspen), black-chinned hummingbird and MacGillivray's warbler (mountain brush), calliope hummingbird, broad-tailed hummingbird (riparian).

Recreation and Transportation Impacts to Wildlife

Significant progress has been made over the past four years in managing impacts from motorized recreation on wildlife and habitats. In 2005, the revised motorized travel plan for the Caribou was signed and put into effect. This plan is being implemented on the District through closures to motorized cross-country travel, opening and signing designated motorized routes, closing access to designated non-motorized trails and year-round law enforcement efforts and targeted patrols during high use periods. Legal habitat protection measures are in place with the revised forest plan, travel management plan, forest regulations, and state law. The critical issues over the next five years will be targeting key areas that are receiving either heavy use and seeing resource impacts, and areas where illegal motorized travel is occurring and resource damage and impacts to wildlife habitats are taking place. Some of the areas currently needing attention from a wildlife habitat protection standpoint include, South Mink, East Mink and Crystal/Elk Meadow. Specific sites where off-road, cross-country travel is occurring will be target for repair and barriers.

The trend for motorized recreation is increasing annually. The number of OHV's in Idaho has increased 5-fold since 1994 (IDFG 2009). Additionally, based on recent state legislation passed, the state is a strong supporter of OHV recreation and the economic benefits of this activity. As use increases, it will be important for the Forest Service to proactively manage this activity to allow adequate recreation opportunities, but protect wildlife habitat and other important forest resources. Starting in 2009, the Idaho Fish and Game Commission placed a motor vehicle restriction on the area (Unit 70) while hunting big game and upland game (IDFG 2009). This restriction limits the use of OHV's to roads open to full sized vehicles and restricts their use to transportation (they cannot be used to actively hunt from). The impacts to wildlife (disturbance), big game population structure, wildlife habitat, and user-created trails will be important to monitor over the next five years in the watershed area.

Another important issue is dispersed camping and associated motorized recreation impacts within the watershed area. As the population of the Pocatello area increases,

there is more camping pressure in the watershed area. Some of the increases are being seen at the Forest Service campgrounds. However, much of the increase is being seen as dispersed camping within the watershed. The most heavily impacted area within the watershed is the Mink Creek drainage. In 2008, access to the heavily used dispersed camping sites along the East Fork of Mink Creek in the state section (T8S, R35E, Sec 16) was closed due to resource damage. This was a state action, but the Forest Service Ranger District was a proponent. This action has shifted the recreation pressure to other areas in Mink Creek, particularly the South Fork.

Range Resources

Range resources and livestock grazing are discussed in another section of this document, however, the condition and trend of the range is critical to wildlife resources. Healthy rangelands promote diverse, robust wildlife populations. The areas within the watershed analysis area are in a rotational grazing system that is overseen by the District Range Staff. Additionally, the municipal watershed area is not grazed and can be used as a reference area for much of the watershed. It is important to note that precipitation is the annual driving factor of the range condition and both cattle and big game, especially elk, affect range conditions. At the current time, elk numbers are fairly low within the watershed. This is by Idaho Fish and Game design in order to promote mule deer over elk within the area. Finally, it is unclear what affect grazing herbivory has on aspen regeneration, but it is likely that fire suppression has a much greater impact on aspen succession to conifer than does grazing.

Beaver Ecology

The current population of beavers in the watershed area is unknown, but based on visual inspections of many of the drainages in the watershed, there is beaver activity in most if not all of them. Based on physical evidence and discussions with Idaho Fish & Game Biologists and local residents, beaver numbers and activity has increased somewhat over the last ten years in the watershed. Beaver are a keystone species in this watershed in that they significantly influence the stream hydrology and dramatically change and enlarge the riparian area. This increases and diversifies habitat for many other species. There are conflicts with beavers in several localized areas where their activities inundate roads, campgrounds, water diversion structures and other infrastructure. These site-specific areas change from year to year based on beaver locations and population levels.

Loss of Aspen and Fire Return Interval

The loss of aspen is a significant issue within the analysis area. Based on a review of historical photographs and field observations of downed aspen logs within coniferous forested areas in the watershed, there has been a significant loss in the number of acres of aspen habitat. Additionally, there are a large number of acres of aspen that are heavily encroached upon by conifers and are in the process of converting to a conifer vegetation type through the forest succession process. Aspen is a critical habitat type for many species of wildlife, including migratory birds, ruffed grouse, mule deer, and elk.

Aspen is maintained through disturbance (Jones and DeByle 1985). The natural disturbance element in these communities was fire. However, natural fires and a regular fire return interval has been largely controlled within the watershed over the last century through fire suppression efforts. In general, the Forest Service has had a >95% success rate of extinguishing initial attack fires in the region. This control of lightning ignited fires suppressed aspen regeneration and allowed the encroachment of conifers in aspen stands, which over time succeeds to a conifer vegetation type.

Residential Development

A fair amount of the private land on the north side of the watershed near Pocatello has been developed in one to five acre home lots over the last thirty years. Much of this development has occurred on mule deer winter range. The expectation is that this development pattern will continue or even increase over the next five to ten years. This is an issue primarily for big game, but is a relatively small percentage of the overall winter range available.

Wildlife Education

Idaho Birding Trails began in August 2006 with a 135 page book and a web site (IDFG 2006a). It is a relatively new wildlife initiative and ties into the Wildlife Viewing areas. Like Alabama, Kansas, Florida, Montana, Wisconsin and others, Idaho now promotes nature-based tourism opportunities in the form of premier birding spots throughout the state. The Idaho Birding Trail was developed by the Idaho Department of Fish and Game's nongame program with other state, federal, and private partners to promote opportunities for rural economic growth in the form of providing amenities to travelers who are birding, and to promote the conservation of bird and wildlife habitat to maintain the quality of life for Idahoans.

Mink Creek Subloop Idaho Birding Trail #15: Bird watching is expected to increase in the watershed as it has nationwide.
Cherry Springs Nature Area Wildlife Viewing Area #62: This is one of a growing list of sites throughout the U.S. Public visits to the watershed to view wildlife and native habitats are expected to increase due to its proximity to Pocatello. It is one of 94 areas identified in the first Idaho Wildlife Viewing Guide (Carpenter 1990).
Mink Creek / Cherry Spring Nature Area Important Bird Area #41: It is also expected to increase in public use. It is one off 55 Important Bird Area in Idaho. Idaho's Important Bird Areas (IBA) Program was launched in 1996 as a partnership between Idaho Partners in Flight and the Idaho Audubon Council. Since 1997, the IBA Technical Committee has encouraged and reviewed nominations for potential IBAs. To date, 55 sites have been officially recognized as IBAs in Idaho, representing 3.8 million acres of public and private wetland and upland habitat throughout the state. The monitoring phase of the Idaho IBA program is underway, with monitoring at several IBAs being conducted either by biologists responsible for the management of the area, or by volunteers. These monitoring efforts, which are intended to collect basic information about the IBAs, will

create an inventory of bird species present at each site, at a minimum, and will likely lead to further investigations.

The Nongame and Endangered Wildlife Program of the Idaho Department of Fish and Game, where the IBA Program is now housed, has recently initiated a coordinated all-bird monitoring program, the Idaho Bird Inventory and Survey (IBIS), that will initiate more extensive monitoring at all wetland IBAs and select upland IBAs across the state. Under the IBIS program, monitoring was initiated at five wetland IBAs in 2004, with 20 more being added in 2005. In addition, proponents are being sought to work toward conservation and stewardship of IBAs. These individuals and organizations will be champions for bird conservation at particular sites and will work cooperatively with each site's land manager or landowner.

Currently there is significant daily use of the Cherry Springs Nature area trails and regular use, especially on summer weekends at the Scout Mountain Nature Trail. There are some botanical interpretive signs at the base of some of the native plants in the area, however, there are no interpretive or educational signs in the area with regard to wildlife, habitats, or ecosystem processes such as fire or beaver dam activity. With the heavy visitation to the area, this would be an excellent opportunity to provide educational information to the public, plus a location where the Forest Service could educate the public on habitat restoration needs and how we plan on meeting these needs.

RECREATION

The analysis area has a variety of land ownership, public and private. The City of Pocatello, Idaho State University, State Department of Lands, and the Bureau of Land Management all own land and manage recreation uses within the watershed. The public is often confused over who manages what land or activity. The Forest Service manages a variety of special use permits within the area that provide unique recreation opportunities to the community. These are listed in Table 28.

Residents of Idaho participate in outdoor recreation in larger numbers and more frequently than the average American (USDA Forest Service 2005). Locally, the student population of Idaho State University has a high participation in outdoor recreation. These factors along with the close proximity of the analysis area to valley communities contribute to heavy year-round recreation use today.

Dispersed and Developed Camping

Dispersed and developed camping is one of the most prevalent uses of the analysis area during the snow-free season. Scout Mountain Campground receives moderate use in the spring and fall, and heavy use during the summer months. Scout Mountain Campground and Scout Mountain Picnic Area were merged in 2006, and now both sites are managed as Scout Mountain Campground. Livestock grazing activities can conflict with campground uses if the perimeter fence fails.

The BLM manages a small low-development campground at Goodenough Canyon, this campground is very popular and serves as a trailhead for Forest trail # 153 (ATV) and trail #195 (motorcycle).

Dispersed camp sites along the South Fork of Mink Creek Road, Scout Mountain Road and the lower Scout Mountain Loop Road (also called the Camp Taylor Road, Forest Road #002) receive heavy use in summer and fall. Some dispersed camping occurs at other locations in the analysis area, but is limited by private land, steep terrain or lack of vehicular access. The Forest Service has established a camping stay limit of 16 days; the BLM's camping stay limit is 14 days. Some dispersed camping exceeds established stay limits in isolated pockets of the analysis area, most notably Crestline Trailhead area and the South Fork of Mink Creek. In the late summer the dispersed camping setting can be adversely affected by cattle grazing. Most complaints are based on the quantity and location of manure piles and associated flies and trampled riparian areas, specifically in the South Fork of Mink Creek.

Winter Recreation

During winter months, the analysis area serves snowshoers, skiers and snowmobilers who flock to winter trailheads to escape the "Great Indoors". There are several areas within the Mink Creek watershed that are managed for a non-motorized setting during the snow

season. These include the West Fork, Valve House and Corral Creek. Park N'Ski lots serve the Nordic trails. The ski trails and the East Fork of Mink Creek Nordic Center are used by local residents weekdays and weekends.

Crystal Summit Parking Area, at the headwater of Upper and Lower Rattlesnake Creek, serves as a major snowmobile trailhead. The parking area is owned by Power County, but is managed by the local snowmobiling club. Snowmobile warming shelters are located on the upper reaches of Scout Mountain (Mink Creek) and in Elk Meadows (Gibson Jack Creek) on National Forest System lands. The A-frame shelters are maintained by the local snowmobile club. The Forest plows winter parking lots in cooperation with the State of Idaho Parks and Recreation.

Transportation and Travel Management

Many people visit the analysis area for recreational travel, including driving for pleasure (sedan and 4X4 travel) and motorized and non-motorized trail use. Weekday trail use is common, especially during the late afternoons and early evenings due to the area's close proximity to valley communities. The analysis area's non-snow season trail system is popular and receives heavy use from early spring into late fall. Gates are used to control motorized access on some area roads and trails during wet times and snow season.

The travel plan was revised on the Westside Ranger District in 2005, and snow-free designated motorized routes are depicted on the 2009 Motor Vehicle Use Map. On National Forest system lands within the analysis area, there are approximately 45 miles of ATV/motorcycle trails, there are 20 miles of motorcycle trails and 30 miles of trails managed for mountain bikes, hikers and stock travel. Some trail miles are not maintained to standard and some are dead-end trails or trails with difficult access. The District is in the process of improving route signing, trailhead information and enforcement in accord with the 2005 Travel Plan decision. Trail users often leave livestock gates open. Cattle often leave manure and trampled riparian areas that are, in turn, reported by trail users.

Cherry Springs Nature Area offers a 1.3 mile paved trail and serves area residents as a low-development city park. Day-hiking and bird-watching are popular along many trails within City Creek, Mink Creek and Gibson Jack. The local Audubon Society frequently uses Cherry Springs Nature Area and Kinney Creek trail for organized bird watching events. Pocatello has an avid mountain biking community that travels on motorized and non-motorized trails as soon as they are free of snow.

Trails close to the City of Pocatello are frequently used by people with dogs. Dog waste along the Mink Creek trails, within Cherry Springs Nature Area, and along the City Creek trails has been identified as a health and safety concern. Waste receptacles are being installed at these problem areas.

The analysis area offers numerous motorized trails in a variety of settings for ATV and motorcycle travel. The Pocatello Trail Machine Association helps to maintain the designated travel routes within the analysis area. Fall motorized travel is usually

associated with scouting or hunting for big game or upland game birds. Illegal motorized travel is a problem during early spring and late fall throughout the analysis area. Rock barriers have been installed at many locations on National Forest lands to prohibit off-route travel.

The Bureau of Land Management Pocatello Field Office will begin the route designation process within the year. The City of Pocatello is in the process of designating routes for the City Creek road and trail system. It is unlikely that the Idaho Department of Lands will designate motorized travel routes due to the scattered nature of their holdings; however, they have recently closed off the State of Idaho parcel within the East Fork of Mink Creek to full-sized vehicle travel using rock barriers and gates.

Hunting, Fishing and Gathering Forest Products

The area continues to receive heavy use from big game and upland game hunters during the fall and early winter. Fishing opportunities are limited to small streams and ponds within the analysis area. Firewood gathering of dead and down trees has been allowed within the analysis area for many decades and this use continues. Since the early 1980s, commercial gathering of forest products and Christmas tree cutting has not been permitted on National Forest System lands within the analysis area.

Partners in Outdoor Recreation

The City of Pocatello is fortunate to have a large acreage of land on the West Bench of Pocatello. The city property located along the bench of the Portneuf River is primarily managed for watershed benefits, however, recreation uses are allowed. An extensive and dense road and trail system is used for hiking, mountain biking, horseback riding, 4X4 driving, and motorized vehicle trail riding. The City of Pocatello manages the East Fork of Mink Creek Nordic Center under special use permit with the Westside Ranger District.

The City of American Falls manages boat docks, marinas, campground, paved nature trail and beach along the shores of American Falls Reservoir. Idaho State University offers information and organized adventures through their Outdoor Recreation Program. The State of Idaho Department of Lands manages intermittent parcels of one-mile sections of land. These parcels are used for 4X4 driving, OHV riding, hiking and dispersed camping. Hunting, fishing, and wildlife viewing opportunities are managed by the Idaho Department of Fish and Game. The Fort Hall Indian Reservation provides waterfowl hunting and fishing by permit on tribal lands. Most reservation permit hunters and anglers are visiting tribal lands to the north of the analysis area. The Westside Ranger District also offers archery, recreation residences, cabin/lodge rentals, and groomed ski trails under special use permit.

Table 29 lists the outdoor recreation providers within the analysis area. Some providers manage public lands and others help manage uses.

Table 29: Recreation providers and opportunities within the analysis area.

Recreation Provider	Recreation Opportunities	Lands Managed
City of Pocatello	**City Creek Trail System, East Fork of Mink Nordic Center (permit)**	**Manages City Creek parcel on West Bench within Trail Creek**
City of American Falls	**Manages two marinas, wetlands and campground at American Falls Reservoir under concession**	**Manages small parcels adjacent to AF Reservoir (within Trail Creek and Eagle Rock Creek)**
Idaho State University	**Offers a variety of organized outings for students, outdoor rec. info. & map provider**	**Does not manage land for outdoor recreation within analysis area.**
State of Idaho Department of Lands	**Offers camping, road and trail travel, hunting and fishing on scattered parcels**	**Manages scattered one square mile sections of land on benches and ridges within most watersheds of analysis area**
Idaho Department of Fish and Game	**Regulates hunting and fishing, promotes non-game wildlife viewing**	**Does not manage land for outdoor recreation within analysis area**
Fort Hall Indian Reservation	**Offers fishing and waterfowl hunting opportunity under permit on Tribal lands.**	**Manages lands within six watersheds along western portion of analysis area**
Bureau of Land Management Pocatello Field Office	**Offers camping, hunting, fishing, road and trail travel on scattered parcels of valley benches and ridges**	**Manages lands on benches and ridges within most watersheds of the analysis area**
Westside Ranger District of the Caribou-Targhee National Forest	**Offers camping, hunting, fishing, road and trail travel**	**Manages lands on uplands and ridges within most watersheds of the analysis area**

Table 30 Developed Sites/Trailheads within Analysis Area

Name/Manager/Watershed	Facilities	Activities	Capacity	Deferred Maintenance Needs
Cherry Springs Nature Area (FS, Mink Creek)	Parking, Gate, Toilet, Paved Trails w/Bridges, tables, benches	Walking, biking, picnicking, nature study, dogs on leash	Parking for 20 vehicles	Four bridges need repair/replacement, Asphalt trail needs surface repair, additional interpretive signs
Lead Draw Trailhead (FS, Mink Creek)	Parking, Gate, motorized & non-motorized Trails	Motorcycle riding, hiking, mountain biking, target shooting off Trailhead,	Parking for 20 vehicles	New barriers and gates

Kinney Creek Trailhead (FS, Mink Creek)	Parking, Gate, non-motorized trails	Hiking, bird watching	Parking for 2 vehicles	Signs
Scout Mountain Campground & Group Area (FS, Mink Creek)	Toilets, water system, tables, fire rings	Camping, picnicking, dogs on leash		New restrooms, expand west loop
Camp Taylor Organization Camp (FS, Special Use, Mink Creek)	Toilets, water system, lodge and cabins	Camping, picnicking, dogs on leash		Signs
Scout Mountain Recreation Residences (FS, Special Use, Mink Creek)	Toilets, water system, lodge and cabins	Cabin use	10 cabins	Road drainage
Scout Mountain Archery Range (FS, Special Use, Mink Creek)	Toilets, water system, hiking trail w/targets	Archery, Competition shoots, picnicking Dogs on leash	Parking for 5 vehicles	Signs
West Fork/Valvehouse Trailhead (FS, Mink Creek)	Parking, information board, fence, barriers, non-motorized trail, motorized trail	Hiking, mountain biking, ATV & motorcycle riding	Parking for 15 vehicles	Signs, barriers
Mink Creek Group Area (FS, Mink Creek)	Parking, gate, info. board, toilets, water system, open pavilion, tables, fire rings, electricity at pavilion	RV and tent camping, picnicking, weddings, field sports	Parking for 50 vehicles (200 person limit)	Improved native turf, improve streamside vegetation
Gibson Jack Trailhead (FS, Gibson Jack Creek)	Parking, info.board,gate, bridge, motorized and non-motorized trails	Hiking, mountain Biking, ATV & motorcycle travel	Parking for 3 vehicles	Expand parking and turn-around, gravel lot, bridge replacement (too small for high water)
Corral Creek Trailhead	Parking, Info. board, gate, Motorized trail	Motorized travel	Not determined	Replace info. board, enlarge or relocate parking
Goodenough Campground and Day Use Area (BLM, Goodenough Creek/Marsh Creek)	Toilets, water system, tables, fire rings, sandbox, horseshoe pits	Camping, day use	Not determined	Site to be re-designed to reduce impacts to stream
Crestline Trailhead	Signs, rock barriers, bridge	Disp. Camping, motorized trail use, mountain bike use	Not determined	Info. board with map

CULTURAL RESOURCES

The lands within the analysis area are used by members of the Shoshone-Bannock Tribes for traditional practices such as hunting, fishing, and gathering. Tribal members also utilize the Portneuf watershed assessment area for traditional activities such as ceremonies and religious practices. Additionally, Tribal members also exercise rights under the cessation agreement and currently utilize grazing allotments within the analysis area.

Spirituality and religious ceremonies continue to play a significant role in American Indian cultures. Natural resources, such as sweet sage and tobacco, played an integral part of these ceremonies. Shoshone and Bannock Tribal members also gather plants for medicinal purposes, including chokecherry, sagebrush, and peppermint and other plants for shelter and food. Elk, deer and moose are hunted and used by the Tribal members. The Shoshone and Bannock Tribes still rely on upland game birds and small mammals. Thermal pools, natural spring sources and other water features are also utilized by the Shoshone-Bannock Tribes. Rock and clays are used for ceremonies, ornamentation, and shelter.

These activities are still practiced today across the analysis area, although the extent of those activities is unknown. Many tribal members hunt, fish, and gather for subsistence and to maintain their traditional way of life. The 2009 Farm Bill includes consideration for tribal use and collection of forest products.

Several federal mandates require consultation and coordination with Native American Tribal Governments. These include, but are not limited to, National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Native American Graves Protection and Repatriation Act (NAGPRA), American Indian Religious Freedom Act (AIRFA).

Currently there have been approximately 69 cultural resources surveys conducted within the Portneuf Watershed. These surveys have been conducted in advance of recreation, range, lands, wildlife, timber, and mineral projects. Based on these surveys 22 sites have been identified within the watershed. These sites include historic properties such as a foot bridge, Civilian Conservation Corps (CCC) era bridge, CCC era rockwork, a cabin, water system and remnants of historic ski area. Prehistoric sites include remnants of historic tool making (lithics), projectile points, groundstone, and other evidence of prehistoric habitation.

Of the sites, 10 have been not been evaluated for inclusion on the National Register of Historic Places, 2 have been determined eligible for inclusion, and 7 have been determined to not be significant, therefore, not eligible for inclusion on the National Register. Sites which have not been evaluated must be managed as eligible properties until they are evaluated otherwise.

Forest uses are currently affecting significant sites. Unauthorized user created routes and dispersed camping areas along the South Fork of Mink Creek Road are specific areas where adverse impacts are occurring. An interdisciplinary approach to these affected areas will need to be developed in order to appropriately mitigate these effects.

The following table documents the Heritage Resources Project completed in the analysis area to date.

Table 31: Heritage Resources Projects Completed Within the Portneuf Watershed Analysis Area

Year	Project #	Project Name	Benefiting Function	Quads	Ac/Mi	Sites
78	28	Monument Gulch Trail Relocation	Recreation	13,14,23	34	none
78	37	Monument Gulch Trail Relocation	Recreation	13,14,23	34	none
78	256	Alcoa Silica Mineral Exploration	Cultural Res.	23	785	none
79	34	Five Stockponds S. Mink, Elk Meadow	Range	23	1	none
79	37	Corral Creek Fence Cattle Guard	Cultural Res.	23	2	27
79	145	Five Stockponds S. Mink, Elk Meadow	Range	23	1	none
79	153	Lead Draw Water Development	Watershed	24	1	none
79	212	Five Stockponds S. Mink, Elk Meadow	Range	23	1	none
79	226	Lead Draw Water Development	Watershed	24	1	none
79	392	Scout Mountain C.G. Reconstruction	Cultural Res.	24	50	26
79	463	Bannock Guard Station	Cultural Res.	23	37	none
80	12	Slate Mountain	Trail Reconstruction	23	0	none
80	37	Slate Mountain	Trail Reconstruction	23	0	none
80	48	South Fork Mink Creek	Training	23	60	39,41,42
80	54	South Fork Mink Creek West	Training	23	80	40,43
80	463	Cherry Spring Campground	Redevelopment	14,23	30	none
81	244	City of Pocatello Land Exchange	Lands	14		79
84	285	Pocatello R. D. Adm. Site Inv.	CRM	8,17,23	53	78,106-109
84	355	Pocatello R. D. Adm. Site Inv.	CRM	8,17,23	53	78,106-109
85	418	Box Canyon Fuelwood Area #1	Wildlife	23	8	none
85	426	Box Canyon Fuelwood Area #2	Wildlife	23	6	none
87	60	Mink Creek Timber Sale	Timber	23,24	415	116
87	60	Meridian Minerals (Mink Creek)	Minerals	23,24,29,30	22	117,118
87	183	Mink Creek Timber Sale	Timber	23,24	415	116
87	195	Meridian Minerals (Mink Creek)	Minerals	23,24,29,30	22	117,118
87	232	Mink Creek Timber Sale	Timber	23,24	415	116
87	427	Cherry Creek CG (CCC)	Recreation	14,23	50	119

88	12	Outlaw Spring Mineral Exploration	Minerals	13	40	none
88	244	Outlaw Spring Mineral Exploration	Minerals	13	40	none
90	55	Cordex Exploration	Minerals	23	24	142
91	71	Valve House Blind Proj	Range	23	1600	none
91	195	Valve House Blind Proj	Range	23	1600	none
91	293	Valve House Blind Proj	Range	23	1600	none
91	373	Valve House Blind Proj	Range	23	1600	none
91	426	Corral Cr Parking Area	Recreation	23	23	none
92	177	Mink Cr. Bannock Rd. Rockland Tel	Special Use	14,23	73	none
92	181	Green Aspen Regeneration	Wildfire	23	320	none
92	181	Scout Mountain Insect/Disease	Timber	24	500	none
92	231	Mink Cr. Bannock Rd. Rockland Tel	Special Use	14,23	73	none
92	231	Green Aspen Regeneration	Wildfire	23	320	none
92	231	Scout Mountain Insect/Disease	Timber	24	500	none
92	232	Crystal Creek T.S.	Timber	23	320	151
92	256	Green Aspen Regeneration	Wildfire	23	320	none
92	276	Pocatello Pit Tanks	Range	15,23	10	none
92	342	Pocatello Pit Tanks	Range	15,23	10	none
92	392	Pocatello Pit Tanks	Range	15,23	10	none
92	427	Crystal Creek T.S.	Timber	23	320	151
93	40	Clifton Cr. Pipeline		23		none
93	177	Bell Marsh Trail		24	10	none
93	226	Bell Marsh Trail		24	10	none
93	244	Pocatello Land Exchange		14	320	none
94	31	W. Fork Mink Creek Prop.		23	3	none
94	40	Pocatello Municipal Watershed		23	1mi	none
94	177	Walker Creek T.S.		24	1.5mi	none
94	226	Walker Creek T.S.		24	1.5mi	none
94	276	Mink Cr. Spring Dev. & Trough		23	1	none
94	342	Mink Cr. Spring Dev. & Trough		23	1	none
95	283	Mink Creek Road Upgrade		23		18,67
95	348	Mink Creek Road Upgrade		23		18,67
96	33	Elk Meadows Loop Trail	Recreation	14,23	2	none
96	145	Slate Mtn. Valve house Trail Conn.		23	2	none
96	152	Walker Crk. Lead Draw Trail	Recreation	24	7	211-214
96	202	Slate Mtn. Valve house Trail Conn.		23	2	none
96	226	Walker Crk. Lead Draw Trail	Recreation	24	7	211-214
96	293	Mink Creek Group Use Area	Recreation	23	14	122
96	355	Mink Creek Group Use Area	Recreation	23	14	122
98	336	Lead Draw Resource Protection Project	Range	23	1	none
98	373	Lead Draw Resource Protection Project	Range	23	1	none
98	484	Crystal Summit Snowmobile Parking	Recreation	23	18	none
9	577	South Fork Mink Rx	Range		500	448, 449,450

The following table documents the Cultural Heritage sites in the analysis area recorded to date.

Table 32: Site Recorded Within the Portneuf Watershed Analysis Area

Site #	Project #	Smith #	Project Name	Site Type	Artifacts	Evaluation	Easting	Northing
25	30	10PR333	Crystal Creek T.S.	Prehistoric	Lithics	U	379590	4730960
26	33	none yet	Three Rockwork Recording	Historic	Foot Bridge			
27	34	none yet	Three Rockwork Recording	Historic	CCC bridge			
67	181	none yet	Three Rockwork Recording	Historic	CCC rock retain wall			
117	181	10BK072	Corral Creek Fence &Cattle guard	Prehistoric	Flakes, Scraper	U		
118	183	10BK227	Lead Draw-Walker Creek	Prehistoric	Lithics	NE	392800	4731050
119	184	10BK228	Lead Draw-Walker Creek	Prehistoric	Lithics	NE	390776	47332047
120	256	10BK229	Lead Draw-Walker Creek	Prehistoric	Lithics	NE	390601	4732138
151	373	10BK230	Lead Draw-Walker Creek	Historic	Structure	E		
211	427	10BK198	Pocatello Cow Camp	Prehistoric	Lithics	U		
212	427	10BK236	Mink Creek Ski Trail Access	Historic	Structure	NE		
213	427	10BK235	Mink Creek Ski Trail Access	Prehistoric	Proj Points	NE		
214	427	10BK070	Box Canyon Aspen	Prehistoric	Grndston/ Flakes	U	384920	4725460
254	466	10BK132	Meridian Minerals	Prehistoric	Lithics	U	384530	4728880
256	466	10BK133	Meridian Minerals			NE	386600	4726320
330	502	10BK071	Scout Mountain Campground	Prehistoric	Flakes	U		
331	502	none yet	Scout Mtn Summer Homes	Historic	Old cabin			
332	502	10BK077	Hiline aquaduct/Valve House	Historic	Watersystem	E	383930	4731200
333	511	10BK151	Cherry Creek CCC C.G	Mulit-Component		NE	386000	4734000

448	577		South Fork Mink Rx	Prehistoric	Lithics	E
449	577		South Fork Mink Rx	Prehistoric	Lithics	N
450	577		South Fork Mink Rx	Prehistoric	Lithics	N

TRENDS

SOILS AND GEOLOGY

Purpose

To compare existing and reference conditions of specific ecosystem elements.

To explain significant differences, similarities, or trends and their causes.

To identify the capability of the system to achieve key management plan objectives.

Erosion Processes

Soils analyses indicate that most of the soils found on the Lower Portneuf Watershed have moderate to very high erosion potential. However, only minor areas of accelerated soil erosion were identified in this watershed, likely related to the high amounts of vegetative and ground cover that occurs on most locations. Non-maintained roads and trails are the primary cause of accelerated erosion in the watershed.

Table 33: Erosion Potential for Ecological Units in Lower Portneuf Watershed.

Ecological Unit	Landform Position	Erosion Factor (Kw)*/T Factor	Potential Erosion
045 Caribou	Weakly dissected Toeslopes	0.24-0.37/ T=5	Moderate to High
205 Caribou	Steep Rocky Ridgelands	0.24-0.37/T=2-4	Moderate to High
303 Caribou	Steep Mountain Slopes	0.24-0.32/ T=2-5	Moderate
304 Caribou**	Fluvial Basins and Hills	0.32-0.37/ T=5	Moderate
405 Caribou	Canyon Sideslopes	0.28-0.37/ T=1-2	High to Moderate
408 Caribou	Mountains Sideslopes Non-Timbered	0.32-0.37/T=2-5	Moderate
410 Caribou	Canyon Sideslopes Timber	0.32-0.37/ T=1-2	Moderate to High
475 Caribou**	Rocky Foothills	0.24-0.43/ T=1-2	Moderate to High
476 Caribou	Rocky Foothills	0.24-.032/ T=2-5	Moderate to High
557 Caribou	Mountain Sideslopes Timbered	0.32-0.37/T=2-5	Moderate
751 Caribou	Fluvial Dissected Sideslopes	0.32-0.37/T=3-5	Moderate to High
913 Caribou	Escarpments	0.32/ T=3	Moderate to High
23 Bannock Co.	Mountain Sideslopes	0.17-0.37/ T=3-5	Very High
25 Bannock Co.	Footslopes, Fan Terraces	0.24-0.28/ T=5	High
30 Bannock Co.	Mountainsides, Footslopes	0.17-0.49/ T=5	Very High
31 Bannock Co.	Mountainsides	0.17/T=5	Very High
32 Bannock Co.	Mountainsides, Footslopes	0.17-0.32/T=3-5	Very High
38 Bannock Co.	Foothills, Terraces	0.37/ T=3	High
45 Bannock Co.	Mountain Footslopes	0.32-0.43/ T=5	Very High
56 Bannock Co.	Sideslopes of drainageways	0.28-0.37/ T=5	Very High
69 Bannock Co.	Mountain sideslopes	0.32-0.37/ T=3-5	Very High
72 Bannock Co.	Foothills, Fan Terraces	0.28-0.37/ T=5	Very High
79 Bannock Co.	Mountain Sideslopes	0.32/ T=3-5	Very High
80 Bannock Co.	Mountain Sideslopes	0.32/ T=5	Very High
81 Bannock Co.	Lake Terraces	0.32/ T=5	High

83 Bannock Co.	Mountain Sideslopes	0.32/ T=5	Very High
84 Bannock Co.	Mountain Sideslopes	0.32-0.37/ T=5	Very High
92 Bannock Co.	Basalt Flows	0.28-0.49/ T=1-2	Low
93 Bannock Co.	Foothills and Fan Terraces	0.49/ T=5	Moderate
115 Bannock Co	Mountain Sideslopes	0.24/ T=2	Very High
116 Bannock Co	Mountain Sideslopes	0.24-0.32/ T=2-5	Very High

*Kw is a relative value that quantifies the susceptibility of the soils, including rock fragments, to be detached by water.
** Marginally unstable landtypes found in the watershed.

Mountain Sideslopes and Foothills, Non-Timbered

Soils on mountain sideslopes and foothills generally have a moderate to very high erosion potential. However, most soils that have good protective ground cover are near natural background erosion rates. The trend appears to be stable or slightly upward under the current management strategy. Similarly, soils that formed beneath forested vegetation appear to be stable with no erosion occurring due primarily to adequate canopy cover and ground cover. Dispersed campsites created by recreation users continue to reduce ground cover and non-maintained roads and trails continue to cause soils loss and produce sediment. Any measures taken to obliterate existing road prisms that have been closed to use will improve watershed conditions or where roads are open to motorized use, maintenance and drainage will improve conditions. Some gullies are forming on the ridge above the Nordic Ski area and in the trails accessing the ridge. This area would make a good watershed improvement project.

Toeslopes, Terraces, Basins and Hills

Soils found on toeslopes, terraces, basins and hills have low to moderate erosion potential and tend to erode more slowly when ground cover is removed because of gentle slopes. Areas identified as a concern in these ecological units are uncontrolled dispersed camping areas on many of the lower drainage canyons and riparian areas, and livestock effects located in South Fork of Mink Creek drainage. These areas, though not extensive in the watershed, have potential to produce substantial amounts of sediment into nearby streams and reduce long-term site productivity in these areas. When considering watershed improvement projects on these sites, priority should be given to restoring ground cover and controlling erosion on identified uplands where a downward trend is identified in the watershed improvement needs inventory. Also the risk for noxious weed invasion is increased on these sites. Any measures taken to obliterate closed roads will serve to improve watershed conditions. Natural background erosion rates will continue and current management strategies are unlikely to improve these conditions. Soil compaction has been observed in and around dispersed camping areas near the South Fork of Mink Creek in the ponderosa pine plantations and in some riparian areas

Mountain Sideslopes, Escarpments and Canyon Sideslopes, Timbered

These landforms have the highest erosion potential in the watershed. The fact that they have good canopy and ground cover related to conifer and mountain brush vegetation, protects these soils from erosion. Some harvested areas have experienced accelerated erosion but have recovered and the sub watersheds are functioning as they should. Soil

productivity is high on these areas except were soils are shallow. Some areas would improve from vegetation treatments such as prescribed fire based on deep, productive soils and vegetation structure especially in the mountain brush and juniper cover types. Many sites dominated by these cover types could be improved by these kinds of treatments to provide vegetation diversity and structure.

Ground Cover

Using ground cover as a measure of stable watershed conditions, most areas of the watershed appear to be stable with an upward trend, except for those areas of concern mentioned above. Adequate ground cover occurs on most of the areas within the watershed. Areas that have the least ground cover are previously disturbed sites where dispersed camping, timber harvest and livestock loafing areas occur. Ground cover measurements were taken as part of the Ecological Unit Inventory as well as rangeland monitoring efforts. These data indicate adequate ground cover values to protect the watershed from erosive forces.

Table 34. Ground cover monitoring data on the Lower Portneuf Watershed.

Michaud Creek C&H	88% Ground Cover
Old Tom S&G	96% Ground Cover
Pocatello C&H 1996	94% Ground Cover
Pocatello C&H 2009	91% Ground Cover
Walker Creek Sage	95% Ground Cover
Walker Creek Mtn Brush	90% Ground Cover
West Fork Walker Creek	80% Ground Cover
Goodenough	90% Ground Cover
East Fork Mink Creek	80% Ground Cover
Scout Mountain Low Sage	70% Ground Cover

Based on ground cover measurements taken in the 1960's, 1970's, and 1980's, most of the ecological types in the watershed are within properly functioning condition criteria for ground cover requirements. A summary of the range of variability for ground cover by cover type is provided for the watershed (see "A Heirarchical Stratification of Ecosystems on the Caribou National Forest" 1997).

Range of Variability for Ground Cover Requirements by Cover Type

Ground cover for cover types will be maintained at greater than 80 percent of the average expected ground cover for any given cover type to ensure watershed stability. (Example - The average expected ground cover for sagebrush cover type on the Westside Ranger Districts is 77 percent. Eighty percent of the average expected ground cover is 61.6 percent.) Ground cover should never fall below the minimum expected ground cover percentage.

1. Sagebrush.
   - For Westside Ranger District - Minimum Expected Ground Cover = 55 percent; Maximum Expected Ground cover = 92 percent; Average Expected Ground Cover = 77 percent. Has greater than 5 percent of the area covered with sagebrush. Located on mountain slopes and foothills.

2. Aspen.
   - For Westside District - Minimum Expected Ground Cover = 62 percent; Maximum Expected Ground Cover = 94 percent; Average Expected Ground Cover = 81 percent. Located on mountain slopes and canyons at lower elevations.

3. Conifer.
   - For Westside Ranger District - Minimum Expected Ground Cover = 77 percent; Maximum Expected Ground Cover = 96 percent; Average Expected Ground Cover = 89 percent. Located on mountain sideslopes, north aspects and plateaus of higher elevations.

4. Utah Juniper.
   - For Westside Ranger District - Minimum Expected Ground Cover = 49 percent; Maximum Expected Ground Cover = 92 percent; Average Expected Ground Cover = 71 percent. Located on footslopes

of mountains and mountain slopes usually at lower elevations, mainly on Malad and Pocatello Districts.

5. Riparian.
   - For Westside Ranger District - Minimum Expected Ground Cover = 85 percent; Maximum Expected Ground Cover = 100 percent; Average Expected Ground Cover = 68 percent. Located on floodplains, drainageways and on wet meadows in open basins. Includes willow and carex-rush cover types.

6. Mountain brush.
   - For Westside Ranger District - Minimum Expected Ground Cover = 45 percent; Maximum Expected Ground Cover = 92 percent; Average Expected Ground Cover = 77 percent. Located on mountain slopes and basins. Usually found is a transitional zones. Included are snowberry, chokecherry, serviceberry, rose, and bittercherry.

8. Curlleaf mountain mahogany.
   - For Westside Ranger District - Minimum Expected Ground Cover = 52 percent; Maximum Expected Ground Cover = 85 percent; Average Expected Ground Cover = 74 percent. Located on mountain slopes and ridges at lower elevations.

9. Bigtooth maple.
   - For Westside Ranger District - Minimum Expected Ground Cover = 47 percent; Maximum Expected Ground Cover = 90 percent; Average Expected Ground Cover = 77 percent. Located on mountain slopes and canyons.

Mass Stability

Soils that formed on unstable landforms are identified on the original soil inventory map in the Current Conditions section. Few landslides have been initially identified within the watershed. No mass failures in the watershed have been identified as a result of management activities or actions. Climate is the primary factor that determines the occurrence of landslides in a natural setting. Natural landslides will continue to occur on some areas when climatic conditions cause the surface mantle to become saturated with water, combined with slope stability factors of gravity and surface friction. Factors that create potential for mass movements are listed in the Historic Conditions Section.

Mining and prospecting have had non-detectible influence on the watershed. Most mining have been for decorative rock sources for homes such as the slate outcrops near East Fork of Mink Creek.

Summary

Generally, undisturbed soils in the watershed are in a productive state that is associated with good watershed health. Localized impacts on soils related to livestock grazing, dispersed camping, and recreational use have been identified and documented. Roads and trails represent a very small percentage of the acres in the watershed but represent a large percentage of disturbed acres in the watershed. Recreation use, erosion from roads, and livestock use have the greatest potential impact on riparian and upland soils. Erosion from upland soils is occurring where soils have been disturbed related to recreation use, roads in timber sales, and from intensive livestock use. Erosion potential is highest on soils that formed on the mountains, canyon sideslopes, escarpments and ridges because of the steeper slopes.

Photo 24: Active gully erosion on ridge above Nordic Ski area.

Photo 25: Erosion on trail system in upper Valvehouse.

Photo 26: Erosion from roads in Box Canyon that affect S.Fk Mink.

Photo 27: Box Canyon Trailhead.

Geology and Minerals

Because reference conditions were not established for geology and mineral resources, a comparison to existing conditions cannot be made. Ecological trends are not expected to change based on geology and mineral activity.

If the determination is made to allow mineral material extraction to occur in the assessment area (for non FS uses), it would be necessary to locate areas and deposits suitable for such use. Sources of mineral materials for in-service use may also be desirable if local costs for such materials become too great. The FS is under no obligation to make these resources available, either to the public or for FS uses.

Fossil sites suitable for public collecting could be looked for, but would be of such a small size as to not cause a significant disturbance/impact. Individuals will still desire to collect fossils.

WATER

"Long-term monitoring of geomorphic, hydrologic, and biologic characteristics of landscapes provides a means of relating observed change to its cause."
- W. R. Osterkamp & W. W. Emmett

The hydrology-related issues include stream channel and riparian area health, water quality, and watershed function. These issues will be addressed below by the activity types and key question identified earlier.

Livestock Grazing: Hydrologic and aquatic resources have been influenced by livestock grazing. Long-term trends of reducing livestock numbers (see range section), along with improved grazing management have likely improved stream channel, riparian, water quality, and watershed function somewhat over time. The rate of improvement, however, is relatively unknown due to limited data.

The Forest conducted a grazing best management practices (BMP) review on the Pocatello Allotment in 2005 (Caribou-Targhee NF 2005). South Fork Mink Creek within grazing Unit 2 is Functional at Risk with an Upward Trend (**Photo** 28 & **Photo** 29). Although data is limited, the reach visually shows signs of improvement since 1994, especially in the abundance and vigor of willows along the stream channel.

Photo 28: South Fork Mink Creek in 1994 (livestock unit 2).

Photo 29: Same location on the South Fork Mink Creek in 2005. Improved willow abundance & vigor is evident.

South Fork Mink Creek is in great condition within the livestock grazing exclosure (Photo 30). Streambank stability inside the exclosure is 96%, which provides a datum of what area streams can achieve in the absence of grazing. Table 35 contrasts the South Fork Mink Creek stream health indictors (Burton et al. 2008) inside and outside of the exclosure. Many indicators measured outside of the exclosure are not near what they are inside the exclosure, especially streambank stability, vegetative cover along the streambanks, stream width, and the percent hydric species. Aspen regeneration also appears to be more abundant within the exclosure (Photo).

Photo 30. South Fork Mink Creek inside of exclosure. Streambank stability & riparian vigor is higher.

Photo 31. South Fork Mink Creek in grazing Unit 6.

Photo 32: Aspen regeneration appears to be greater inside of the South Fork Mink exclosure (left side).

Livestock facilities (Photo) and water sites (Photo) located in the AIZ create disturbances in close proximity to stream channels. These disturbed areas can deliver runoff and sediment directly to stream channels during storm events.

Photo33: Corrals on East Fork Mink Creek were relocated off the creek in 2001, but they remained in very close proximity to the stream.

Photo34: Livestock watering site in close proximity to stream channel.

The hydrology-related issues are operating near desired conditions in some areas, but they remain below desired conditions in several areas monitored for livestock grazing. Table 35 summarizes the long-term indicators for the riparian DMAs in the analysis area. Forest Supervisor John Parker hit the nail on the head back in 1955 when he said "The problem … is not one of physical improvements but one of getting the proper [livestock] utilization on the usable areas." This remains as true today as in his time. Implementation of the Caribou Riparian Grazing Implementation Guide (Leffert 2005) is critical to improving watershed conditions across the analysis area. When implemented properly, BMPs and adaptive management criteria will maintain or improve plant vigor, stream bank stability, channel stability, willow survival, and water quality (Platts 1981, Hall 1985, & Clarey & Webster 1989). The adaptive management approach has been effective at improving stream channel conditions (e.g. bank stability, w/d, and sediment levels) on the analysis allotments and other nearby National Forest allotments (Bengeyfield 2006a, 2006b & 2005, Bengeyfield & Svoboda 1998).

Table 35: Data summary of long-term indicators for riparian grazing DMA in the area.

Stream: Unit	***Stable Bank (%)***	***Covered Bank (%)***	***Percent saplings & young***	***Percent Mature***	***Percent dead***	***Percent hydric***	***Erosion Resistance***	***Ecological Status***	***Site Wetland Rating***	***Greenline Greenline Width (m)***	***% Woody***	***% Hydric Herb.***
South Fork Mink Creek Exclosure (7/31/2006)	96%	99%	55%	45%	0%	72%	Moderate	Late	Good	0.63	43%	48%
South Fork Mink Creek: Catch Unit (9/28/2006)	39%	63%	33%	67%	0%	52%	Moderate	Late	Good	1.1	26%	37%
Crystal Creek: Elk Meadows/Clifton (8/13/2009)	81%	100%	86%	14%	10%	65%	Moderate	Early	Good	0.55	20%	55%
Kinney Creek: Lead Draw (7/22/2008)	51%	55%	56%	42%	2%	61%	Moderate	Late	Good	1.85	97%	7%
Indian Creek	81%	88%	67%	33%	0%	12%	Moderate	Early	Fair	0.76	67%	0%
Walker Creek	54%	53%	68%	32%	0%	24%	Moderate	Early	Fair	2.0	77%	4%

Transportation System: Several opportunities to reduce erosion and sediment delivery from the transportation system have been identified. These are covered in the next chapter (recommendations). Recent projects in the analysis to remove passage barriers to Yellowstone cutthroat trout have been very successful (**Photo**& **Photo**). The Slate Mountain Trailhead project simultaneously improved watershed, aquatic habitat, recreation opportunities, and public safety.

Photo35: Pre-construction photo of Slate Mountain Trailhead crossing on Mink Creek.

Photo36: Post construction photo of new trail bridge crossing near Slate Mountain Trailhead.

Unmanaged Recreation: Walker et al. (2008) evaluated the City Creek watershed (high recreational use) against the Gibson Jack Creek Municipal Watershed. The authors found City Creek had greater sediment load, E. coli, and carbon concentrations, decreased organic matter processing, and altered invertebrate taxa compared with the less intensely used Gibson Jack Creek. The authors hypothesized that the degraded watershed conditions observed in City Creek may be a result of heavy recreational use. They also emphasized the need to reconsider management techniques within the region.

Beaver Activity: Beaver are still quite common throughout the area. Although data is limited, they appear to be most common on the larger streams and less common on smaller streams. There are abandoned dams that exist on many small streams (e.g. Bull Canyon), but beaver have moved out of these areas.

Photo 37: Beaver activity near Forest boundary on East Fork Mink Creek (winter 2005).

If habitat is adequate, beaver will re-occupy an area. One recent example is the State land section on East Mink Creek. Dispersed camping and motorized use was recently excluded from that riparian area. The stream recovered well and beaver instantly moved into the area (Bryce 2009). The beaver dams have increased the local water table and improved riparian conditions.

Development: A large impact of residential and commercial development occurring near the Forest involves fire protection. Along with that impact, and more directly related to hydrologic resources is emergency watershed protection following wildfire. Burned Area Emergency Response (BAER) teams evaluate the need for treatments to protect human safety and property from flooding and erosion that may occur following wildfires. Increased development near wildlands increases the potential for impacts.
Currently, there is very little impact due to small reservoirs and stream diversions on NFS. The current diversions include the City of Pocatello's water diversions at the Valve House on Mink Creek and on Gibson Jack Creek near the Forest boundary.

Photo 38: USGS camp on Mink Creek. 6/29/1913 (G.R. Mansfield.)

Photo 39: Photo taken 4/21/2009 with wider view.

Photo 40: View up Mink Creek. 6/29/1913 (G.R. Mansfield.)	Photo 41: Photo from 4/21/2009.
	

VEGETATION

Forested Vegetation

Timber stands, including aspen, continue to age. Natural cycles for the stands mortality including insect, disease, and fire can be expected. Stand composition will continue to shift towards later successional species, i.e. Douglas fir and subalpine fir. On a landscape basis, timber stands (including aspen) will move away from Properly Functional Conditions as defined by the Region 4 PFC Plan. This would be particularly true as to stand structure and compositions. Most aspen stands are starting to decline because of age and invading conifers. This could lead to a decrease in species diversity. This trend in stand condition is expected to continue until some disturbance event resets the aging process.

Currently, there is little evidence of insects and disease in the forested vegetation of the analysis area. However, insect population and disease activity can be expected to increase with an aging stand. Along with this, mortality levels will increase without management actions.

During the field season of 2004, 10 plots were surveyed near Justice Park in the Scout Mountain area. This area included units around the Scout Mountain summer homes, the Scout Mountain Campground, Camp Taylor, and the Scout Mountain day use area. Out of the 59 trees that were counted, 51 of them were Douglas fir, 5 were subalpine fir, and 3 were aspen. Only 1 of the aspen trees was alive, the other 2 were dead. With aspen being present in the stand, it indicates that it may have once been an aspen stand that has been completely encroached by the conifer. This area was mechanically treated starting in 2005, and the fuels crew and fire crews have been doing maintenance in this area since. The treatment consisted of felling trees 8 inches DBH or less and thinning out the shrub component with chainsaws. This year (2009) we used the masticator around the summer homes, the camp ground, and the day use area with good results. The cut vegetation was piled and burned, but there has not been a broadcast burn in this area. During the field season of 2008 the fuels crew went back to the original plots. They counted a total of 53 trees; 46 Douglas fir, 5 subalpine fir, and 2 aspen (1 dead, 1 live). There has been little to no aspen regeneration in the Justice Park area since the project began.

From 1997 to 2005, there was about 800 acres treated with prescribed fire in the analysis area. The Portneuf Fire Management Zone hired a fuels crew in the spring of 2004. The fuels crew was a seasonal crew and, although they did all the monitoring, were not involved in the preparation for the burns or the actual burning during 2004 and 2005. In 2006 the fuels crew was brought on early and remained working later in the year to assist with spring and fall prescribed burns. The fuels crew also became more involved with the preparation work for the burns. This usually involves felling trees and putting in the unit and project boundaries. From 2006 to 2009 the Portneuf Fire Management Zone has used prescribed fire to treat 3,285 acres in the analysis area. These prescribed burns have been in both forested areas and sage/shrub communities. Under objectives on page 3-18

in the Revised Forest Plan for the Caribou National Forests it states that an average of 4000 acres of "sagebrush" be treated per year. The plan also states on the same page that "Within ten years of signing the ROD, use prescribed fire and/or mechanical treatments to rejuvenate and restore young aspen on 20,000 acres" (Revised Forest Plan 2003).

Rare Plants

The trails within Gibson Jack Creek and West Fork of Mink Creek RNA are "cherry stemmed" – meaning the trails were not include as part of the RNA at the time of establishment; however the maintenance of these trails is a part of managing for the values within the RNAs. Recommendations and concerns as mentioned elsewhere in this watershed analysis for trails should apply to these trails as well.

Rare plant surveys within the watershed analysis area needed, specifically for foothill sedge, Garrett's fire-chalice ,and Big-leaved sedge.

The use of Cherry Springs Nature Area for education should continue to be supported and maintained, this includes labeling of the plants along the trail and the treatment of noxious weeds.

Research Natural Areas

The Gibson Jack RNA and the West Fork of the Mink RNA appear to be in good overall condition. Non-native invasive plants of concern in the area appear to not be dominating any one area, but cheatgrass (*Bromus tectorum*) is present and smooth brome (*Bromus inermis*) is a dominate grass near the Gibson Jack Trailhead and the West boundary of the RNA. Most of the beaver dams in the area appear to be breached. However, beaver will likely be back soon - if allowed.

A closer look at the potential need for fire in the Gibson Jack and West Fork of Mink Creek RNAs should be done as part of a watershed-wide analysis.

Fire

Fire is historically a natural part of the analysis area's ecosystem. Fire influences plant communities in conjunction with topography, elevation, soils, and climate. Since the practice of fire exclusion began, we have experienced some changes in the native plant communities. The decline of aspen stands due to the encroachment of conifers is one of these changes. With the continuation of fire exclusion, we can expect an increase of dead and down woody material. Also, there will be an increase in the number of stands of decadent shrubs. Another trend we may see is an increase in the amount of insects and disease, which will increase mortality rates. This will increase the risk of having large devastating wildfires.

During the field season of 2009, 30 aspen plots were surveyed within the Blind Springs prescribed burn area. The burn took place during the fall of 2008, and early spring of 2009. Of the 30 plots surveyed, 19 had over 50 new stems per plot. The highest number

of stems per plot was 218, while the lowest number of stems per plot was one. The average number of stems per plot was 87. The Blind Springs burn was conducted to promote aspen stand regeneration. Aspen trees are a shade intolerant species. When aspen are encroached upon by conifer, they are out-competed and begin to decline. Often, conifer removal alone is not enough to start aspen stand regeneration. In order for the aspen stand to start producing new sprouts, the tops of some of the trees need to be killed. This historically occurred naturally by wildfire.

With the predicted climate change of warmer temperatures over the next 40 years, North America could see earlier fire seasons that last longer. Simulations of future climate change indicate a potential increase in atmospheric conditions that promote lightning-caused fires (Whitlock, et. al. 2003)

RANGE

It is unclear when species classified as noxious weeds first entered the analysis area, making long term trend analysis difficult. Short term trend is listed in table two by the weeds of concern existing within the analysis area. Dyers woad is currently the most problematic of the noxious weeds within the analysis area. This weed inhabits sites that are remote and difficult to treat chemically and reproduces both by seed and vegetatively (Whitson, et al., 2006).

Table 36 short term trend of weed species within the analysis area

Species	1998 data	Trend*
Black Henbane		Static
Canada Thistle	307 acres	Static
Houndstongue		Increasing
Musk thistle	107 acres	Static
Poison hemlock	39 acres	Static
Dyers Woad		Increasing
Spotted knapweed		Static
Whitetop		Static

*The trend in weed populations are estimates based on monitoring consisting of field inspections, and chemical/manual/biological treatment. Seasonal conditions are variable and have an annual effect on weed populations.

Chemical, biological, and mechanical acres treated are shown for the last four years in Figure 18. Acres treated do not represent the acres of infestation; the dynamics of weeds prevent all areas of infestation from treatment. Treatment on an annual basis is driven by priority area and budget.

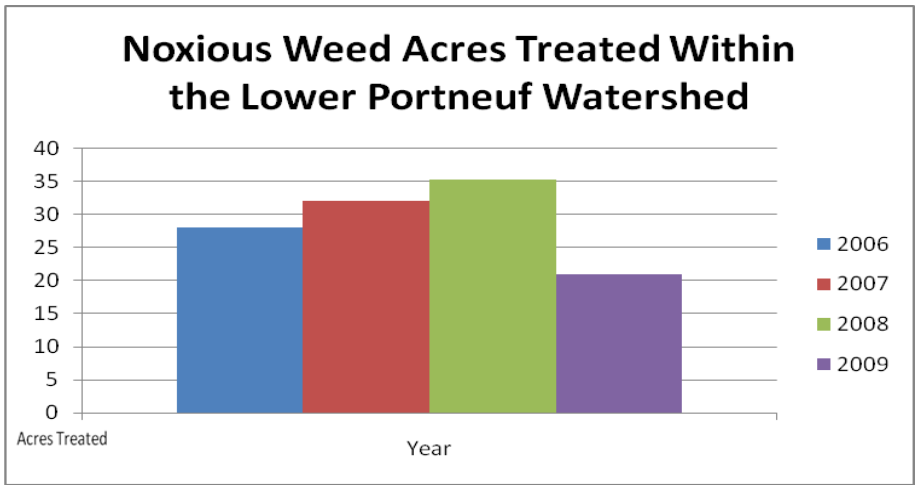


Figure 18: Noxious weed acres treated in the analysis area.

Invasive introduced grass species are another challenge altogether. Within the Lower Portneuf Watershed Analysis area, species of this characterization include smooth brome (*Bromus inermis*), intermediate wheatgrass (*Agropyron intermedium*), bulbuous bluegrass *(Poa bulbosa*), and cheat grass brome (*Bromus tectorum*). Not all of these species are unfavorable. Smooth brome and intermediate wheatgrass are looked upon as favorable for grazing and provide good riparian stability. At one time these species were used by land managers as a tool for re-vegetation. Cheat grass is an annual grass with limited palatability that provides poor stability. Bulbous bluegrass is a perennial grass that provides protection from erosion. However, the downside to these grasses is their propensity to create monocultures, reducing species biodiversity, and the ability to spread rapidly and compete with native vegetation for available resources.

The Caribou-Targhee Noxious Weed Strategy (2005) includes strategies for these and other noxious weeds. Disturbance from activities such as fire, trails, grazing, and recreation has resulted in portions of the analysis area being susceptible to noxious weed invasions and establishment. Although the establishment of some exotic noxious weed species such as knapweed, leafy spurge, and dyer's woad are not dependent upon disturbance, the frequency and intensity of disturbance can be related to the existence and expansion of others. The increase in motorized vehicle use within the assessment area as well as the dispersal of noxious weed seeds by wildlife and recreational stock are all problematic contributors.

Figure 19 illustrates the change in the non-forested vegetation types over time. The types are not directly comparable but the cover types are similar enough to use for comparison purposes.

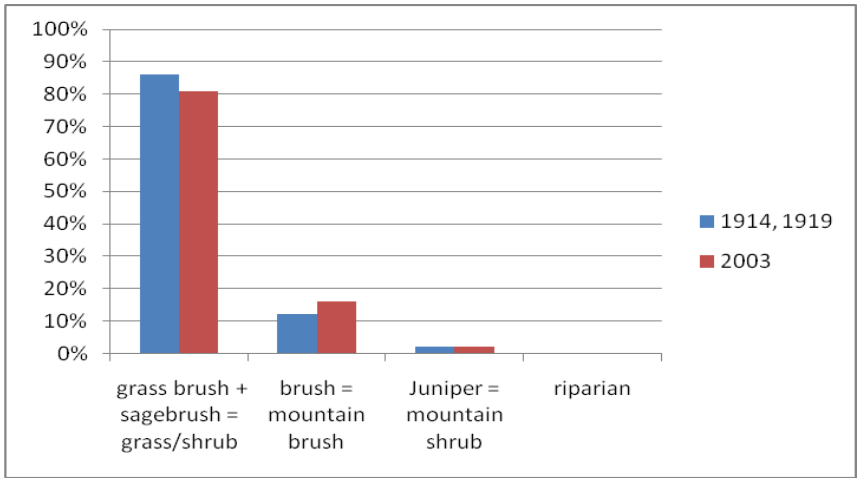


Figure 19: Non-forested vegetation types over time.

The percent cover of sagebrush has increased causing a departure from the desired sagebrush canopy cover class. Based on Prevedel's shrub cover analysis, the analysis area has exceeded canopy cover standards to maintain healthy sagebrush ecosystems. However, the Revised Forest Plan (2003) provides direction to address shrub canopy coverage by treating stands with greater than 25 percent canopy cover using prescribed fire and mechanical treatment (3-18).

Species Composition

A direct comparison of the species composition of forb and grass communities in upland monitoring sites established in the 1950's and 1960's could not be made, due to the differing monitoring methods. To show trend, the composition in 2009 is compared to the desired component as detailed in the SRM (401-402). The composition of grasses in these communities should be 40-50 percent and the forb component should be 20-25%.

Figure 20 details the difference in grass and forb community composition measured in 2009 to the desired grass and forb composition for big sagebrush communities.

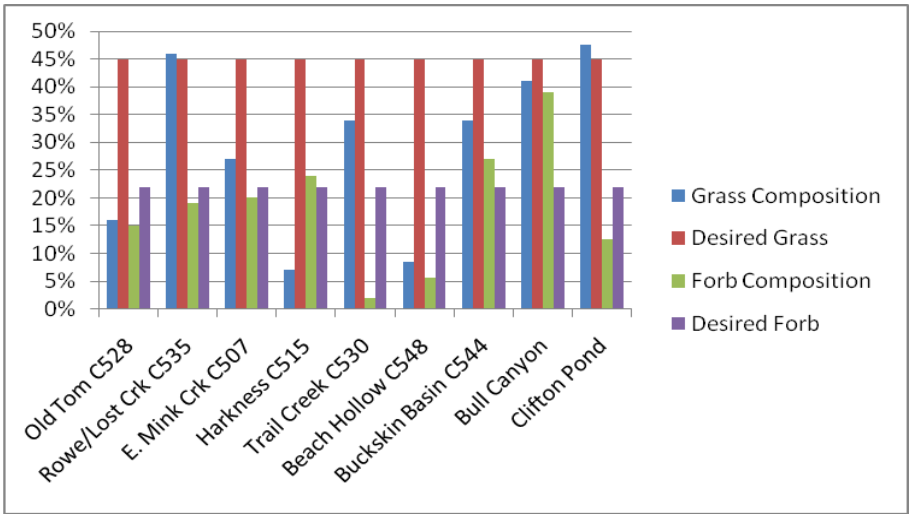


Figure 10: The difference in grass and forb community composition measured in 2009 to the desired grass and forb composition for big sagebrush communities.

According to Larry Fitch, Albert Whitworth, and Dahl Zoner, individuals that helped in the management of the analysis area and with a long term perspective, there has been a decline in aspen and an increase in juniper and mountain mahogany within the last 30-40 years. (Personal Communication, Reference Condition Meeting 5-20-2009).

The Following photos are from the Scout Mountain Parker 3 Step monitoring location. The top photo was taken August of 1964. The lower photo was taken August 2009. Notice the increase in conifers.

Photo 42: Old Tom Mountain 1964

Photo 43: Old Tom Mountain 2009

The following four photos are of the Mink Creek drainage approximatly ½ mile north of the US Forest Service boundary. The older photos are courtesy of USGS photo library and were taken in 1913. The color photos were taken in 2009. Many changes have occurred since the 1913 photos were taken. There is now a highway cutting through the drainage and a residential population. The Mink Creek Cliffs photo could not be taken in

the exact location as the first photo because a house now sits there. Notice the increase in juniper in both photos.

Photo 44: Mink Creek Cliffs 1913

Photo 45: Mink Creek Cliffs 2009

Photo 46: Mink Creek Drainage looking south 1913

Photo 47: Mink Creek Drainage looking south 2009

FISH

This section melds the past and current fisheries conditions and attempts to define the response from aquatic systems within these watersheds. Observed trends in the Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek watersheds will be discussed together.

Once thriving and healthy rivers, today's Lower Portneuf River, Marsh Creek, and Lower Bannock Creek have sediment, water temperature, and water quality issues that decrease their public appeal, recreational fishery, and fitfulness for even public swimming (secondary recreational contact). Urbanization, agricultural practices, industry, mining, irrigation developments, livestock grazing, road construction/maintenance/use and non-native fish introductions over the last 150 years have affected the native fish populations and their habitat.

The Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek watersheds were stocked with several non-native species with the potential to affect Yellowstone cutthroat trout genetic integrity, including rainbow and various cutthroat trout strains. Despite this, recent genetic studies have indicated the genetic traits unique to the Portneuf River Yellowstone cutthroat trout population still exist. The map below, adapted from Campbell et al. (in press), illustrates genetic characteristics for Yellowstone cutthroat trout populations throughout southeast Idaho. The different colors in the pie charts depict unique genetic haplotypes that are attributed to particular populations. Notice the orange color in some pie segments unique to the Portneuf River populations. That genetic material represented by orange was not detected in any of the other Yellowstone cutthroat trout populations in surrounding populations in southeast Idaho.

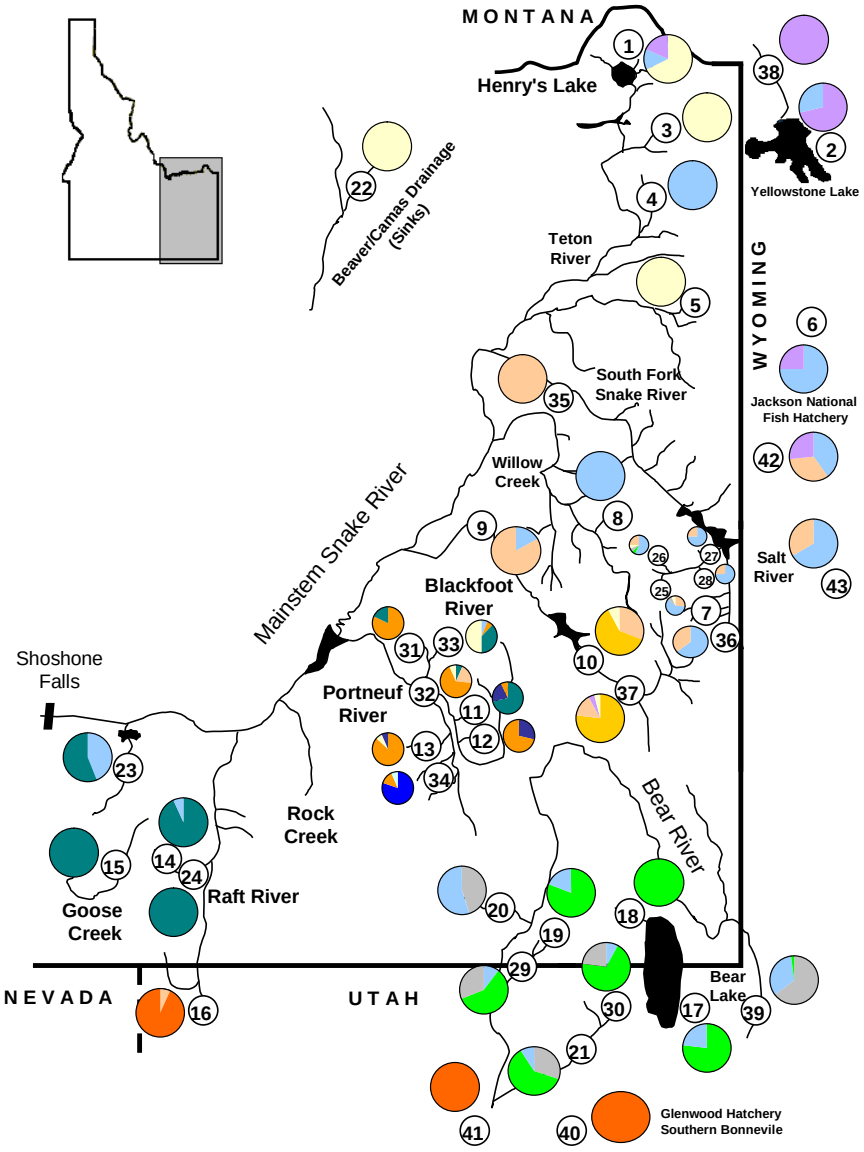


Figure 21: Yellowstone cutthroat trout genetic haplotype charts for the southeast Idaho region adapted from Campbell et al. (in press)

In addition to the finding that Portneuf River YCT populations are genetically distinct, additional genetic research, by Cegelski and Campbell (2006) with Idaho Department of Fish and Game, relates that the Portneuf River YCT population is highly differentiated from adjacent populations. YCT population differentiation in the Portneuf River could result from reproductive isolation due to natal homing or physical (ex. waterfalls or fish barrier culverts) or anthropogenic barriers (ex. habitat degradation, fragmentation, or patchiness) that reduce gene flow and increase genetic drift. Further testing from the study related that many of the fish sampled were likely resident life-history fish and that limited gene flow was occurring in an asymmetric pattern suggesting that migratory barriers are likely the cause of YCT population differentiation in the Portneuf River.

Within the main-stem of the Portneuf River and Marsh Creek, physical alterations and changes in water quality and hydrology limit and segment (isolate) salmonid distribution in the analysis area. Repeatedly, fish sampling throughout the Lower Portneuf River and lower Marsh Creek has turned up limited numbers or reach specific (segmented) populations of salmonids. Minshall and Andrews (1973) noted that during the irrigation season, a decrease in discharge was apparent with a downstream progression. They related that the full impact of reduced flows to aquatic biota in the lower Portneuf is not known but it contributes to a reduction of habitat, higher water temperatures, and a decrease in dissolved oxygen all at a critical time of the year.

Fish sampling presented by IDEQ (2009) in the TMDL Revision also suggests that main-stem hydrology and water quality influences the distribution of salmonids in the Portneuf River. In the Lower Portneuf, salmonids were abundant near Batiste Road due to inputs from springs, creating a gaining reach within the lower river. In addition, comparisons of the fish communities within Marsh Creek and the Portneuf River above the Marsh Creek confluence show that a combination of reduced hydrology, degraded stream habitat and impaired water quality in Marsh Creek influences the fish community in that reach, as well as downstream in the Lower Portneuf River. It is important to note that water quality concerns in Marsh Creek are a result of the total watershed and not the specific subwatersheds included in the analysis area.

Throughout the analysis area, Yellowstone cutthroat trout and non-native trout are isolated in headwater tributaries of the Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek watersheds. Tributaries within these watersheds provide sufficient cold water habitat and refugia that is temporally and spatially unavailable in the larger streams and rivers. This habitat fragmentation may result from both physical barriers and a combination of reduced hydrology, impaired water quality, and habitat degradation. Currently, road networks, irrigation and municipal diversions, degraded habitat, and impaired water quality within the analysis area influence native fish movement and life cycles. When populations of YCT become isolated, as in the Portneuf, these populations can suffer reduced genetic diversity and fitness that can subject them to localized extinctions.

Overall, a combination of isolation (population fragmentation), lack of population expansion and re-colonization, and competition and introgression with non-native fish threatens the resident populations of YCT within the analysis area. The locations of these populations tend to be concentrated on Forest Service and other public lands within the analysis area.

Urbanization, agricultural land use, and irrigation and municipal water use have had the largest impacts upon the physical characteristics of the Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek and their tributaries. Within the analysis area, residential and urban development, industrial pollution, agricultural land use, irrigation and municipal water use, grazing, flood control measures, and road

building/maintenance/use will continue to impact aquatic habitat within the lower parts of the analysis watersheds. Road and trail building/maintenance/use, grazing, logging, mining, fire (including silvicultural prescribed burns), recreation, beaver removal, and angling will continue to impact aquatic habitat in the upper parts of the analysis watersheds.

On Forest Service managed lands some land use trends are evident. Overall levels of timber logging and cattle and livestock grazing are down from historical levels. Large-scale wildland fires have been suppressed for many decades and the ecological role of fire has not been historically or presently used for vegetation management at the landscape scale. Beaver populations across southeast Idaho are rebounding but are likely not at levels found pre-settlement and trapping. To date there has not been any investigation into beaver population status, quantities of available habitat, or habitat and vegetative condition inventories on the Caribou National Forest. Overall, recreation on the National Forest has increased from historical levels and is more diverse today than in the past. Recreation includes hunting and angling. Levels of road and trial building, maintenance, and use are higher than in the past.

Some stream-specific trends were readily apparent within the watershed. These are described below.

Lower Portneuf River

The Portneuf River has been extensively stocked with non-native fish. Many of these planted non-native fish, including brown and rainbow trout (plus hybrids), comprise the majority of salmonids in the river today. Yellowstone cutthroat trout and mountain whitefish are currently found in low densities with the highest concentrations near the mouth. Adfluvial YCT are common in this gaining reach and likely use this area for spawning. This life-history of YCT is likely limited to this reach of the Portneuf due to the channelized river segment in Pocatello that blocks fish passage. Fluvial YCT above this reach are found in low densities with higher amounts of non-native conspecifics. It is likely that habitat and water quality constraints in the main-stem of the Portneuf River create a scenario where the river functions as a biological sink rather than as a source for YCY populations in the subbasin. Habitat and water quality condition in the main-stem Portneuf is likely static despite conservation actions to reduce sediment and promote riparian conditions in the Subbasin. Current conditions are likely more influenced by the watersheds located upstream (like Marsh Creek) of the analysis area and area also driven primarily by hydrologic manipulations or more specifically irrigation withdrawals. Currently, Aquatic Nuisance Species (ANS) are taking over the marcoinvertebrate community in the Portneuf River with the New Zealand mudsnail as the most abundant taxa in the river.

City Creek

In the past, lower City Creek supported a small population of YCT with no non-native trout present. In 2001 sampling by Meyer and the USFS didn’t result in any fish

captures. Fish passage into City Creek has also been blocked for more than 35 years and may have contributed to the extinction of this extant YCT population. Aquatic habitat within City Creek continues to be impacted by recreation.

Gibson Jack Creek

Gibson Jack Creek continues to be a stronghold stream for YCT on the CTNF. YCT are abundant on the Forest and are likely protected from non-native fish colonization by the City of Pocatello municipal diversion which blocks upstream fish passage. In 2001, Meyer sampled below this diversion and found mostly YCT and also low amounts of non-native colonizers including rainbow, hybrid, and brook trout.

Indian Creek

Fish have not been encountered in Indian Creek in the past or present. High amounts of livestock related impacts may be limiting aquatic habitat and establishment of aquatic biota.

Mink Creek

According to the IDFG fish stocking database (IDFG 2009), Mink Creek was never stocked with brown trout. Only rainbow trout have been stocked there. Currently, the brown trout are the most common fish in the main-stem and have started to colonize the East Fork and the West Fork. Despite several identified fish barriers (Valve House and multiple perched culverts) throughout the drainage, brown trout are now found near the confluence with the South Fork. In addition to brown trout issues, long term stocking of Mink Creek with rainbow trout has lead to the development of a hybrid trout population in the lower reaches. Habitat within lower Mink Creek is impacted by urban development, the road network, and riparian modifications near Bannock Guard Station. While habitat within upper Mink Creek continues to be impacted by removal of problem beaver and livestock grazing. Aquatic nuisance species, including the New Zealand mudsnail, are also invading lower Mink Creek.

East Fork Mink Creek

As early as 1975, non-native brook trout and hybrids were encountered in low densities in the East Fork. To date, only one plant of brook trout fingerlings in the West Fork was recorded in 1968 for the entire Mink Creek drainage. Currently, the East Fork Mink Creek fish composition on the forest was mainly YCT with low densities of brook trout present. Fish passage has also been identified as a concern in this drainage with a barrier located upstream of the state land section.

West Fork Mink Creek

West Fork Mink Creek continues to be a stronghold stream for YCT on the CTNF. Current sampling in 2001, 2006, and 2008 has indicated that brown trout are slowly

beginning to colonize the West Fork. In each of these sampling events, only 1 brown trout was captured each year.

South Fork Mink Creek

South Fork Mink Creek continues to be a stronghold stream for YCT on the CTNF. Several fish passage barriers, beaver and roadway conflicts, and sediment generation from the transportation corridor continue to impact YCT and aquatic habitat. In addition, increased recreational use and livestock grazing are also impacting aquatic habitat.

Marsh Creek

The Marsh Creek fishery has been heavily supplemented with brown trout in the past. In addition, the lower portion of Marsh Creek in the analysis area continues to suffer from habitat degradation and impaired water quality. Comparisons of fish communities in lower Marsh Creek and the Portneuf River above Marsh Creek found that the Portneuf had six times as many trout than the Marsh Creek sampling segment. In addition, IDFG's Mende found low densities of mountain whitefish in Marsh Creek over 10 years ago. These fish have not been encountered since and have likely been extirpated from this stream segment.

Walker Creek

Walker Creek is considered a stronghold stream for YCT on the CTNF. Periodic sampling has only found low densities of YCT in the stream. Sampling of South Fork Walker in 2001 found that this tributary was fishless. Aquatic habitat within Walker Creek is impacted by heavy grazing and fish passage barriers and sediment issues from a road corridor located in the valley bottom.

Goodenough Creek

Goodenough Creek is considered a stronghold stream for YCT on the CTNF. Periodic sampling has only found low densities of YCT in habitat the stream. Aquatic habitat in Goodenough Creek is in good condition. Trail and road crossings on BLM and USFS present sediment and fish passage issues.

Mormon Canyon

In 1987 Mormon Canyon Creek was found to support YCT in low densities. Another survey upstream on USFS lands in 1999 didn't encounter any fish. One road crossing located on BLM land may inhibit fish passage.

Birch Creek

In 1987 Birch Creek was found to support YCT. However, sampling conducting in 2001 by Meyer found a fish community of only dace and sculpin present.

Bell Marsh Creek

Periodic sampling of Bell Marsh Creek has found that the stream supports a population of YCT. However, Crist and Holden conducted sampling in1987 and found mostly YCT and 1 brown trout. Later sampling by Meyer and the USFS in 2001 did not find YCT and documented a further colonization of brown trout.

Garden Creek

Garden Creek was previously supplemented with rainbow and brook trout in the early 1970's. Subsequent sampling in 1975 found mostly YCT and 1 brook trout. More current sampling in 2000 found only low numbers of brook trout.

Clifton Creek

Clifton Creek was previously stocked with YCT fry in 1984. No sampling has been conducted to determine the current status of the fishery.

Crystal Creek and Midnight Creek

Crystal and Midnight creeks were both sampled by the BLM in 2000 and found to support low numbers of YCT. In 2001 the USFS re-sampled these streams on Forest and encountered very low flows and no fish. Notes from both surveys indicated that these lands were heavily grazed.

WILDLIFE

Species

American peregrine falcon (*Falco peregrines anatum*): Eliminating the use of DDT allowed the peregrine falcon to recover within the contiguous US. There are no known falcon eyeries within the watershed, however, protection is in place through the MBTA, EO13186, Eagle Protection Act, and the Forest Plan.

Bald eagle (*Haliaeetus leucocephalus*): Eliminating the use of DDT allowed the eagle to recover within the contiguous US. There are no known nesting bald eagles within the watershed, however, protection is in place through the MBTA, EO13186, Eagle Protection Act, and the Forest Plan.

Boreal owl (*Aegolius funereus*): Generally, trends are related to the status of mature forests at higher elevations. No information about this species exists within the watershed. Surveys for boreal owls are suggested.

Flammulated owl (*Otus flammeolus*): Population data are inadequate for trend assessment for this species. Generally forest standards for snag retention are met within forested areas on the watershed. Surveys for flammulated owls are suggested to better understand the status of this species within the watershed.

Great gray owl (*Strix nebulosa*): Population trend may have increased as stands of lodgepole pine habitats have matured with succession or decreased with recent logging. However, the status of this species within the watershed is unknown. Surveys are suggested.

Northern goshawk (*Accipiter gentilis*): Succession to mature forest stands has created an abundance of habitat for old growth dependent wildlife. There is a lack of young- and middle-age stands to provide the diversity to maintain the composition and structure needed over the long term for wildlife. Additionally, mature aspen with a somewhat open canopy, a preferred nesting habitat of the goshawk, is threatened by conifer encroachment as a result of the lack of fire in these habitats.

Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*): In 2000 the USFWS determined that listing of the Columbian sharp-tail grouse was not warranted. They recognized that there have been declines in populations primarily attributed to the loss and degradation of important shrub-steppe, grassland, and riparian habitats. They also recognized that various State and Federal agencies are actively managing the populations to try and improve their overall status and/or attempting to restore them to currently unoccupied habitats. CRP lands (68,500 acres in Caribou County and 27,043 acres in Bear Lake County) provide nesting and brood rearing habitat in the watershed. The local population is still adequate to allow a hunting season. With changes in the program, CRP lands will significantly decrease. As lands enrolled in CRP are put back into crop production there may be increasing impacts to sharp-tail grouse.

Greater sage-grouse (*Centrocercus urophasianus*): These grouse need vast expanses of big sagebrush rangeland with 10-30 percent sagebrush canopy cover with a healthy understory of forbs and grasses to thrive. Actions that reduce these values will likely result in reduced greater sage-grouse numbers (IDFG et al. 2004). The trend in rangeland management is to reduce sagebrush densities where needed through prescribed fire to maintain grass and forb production, re-introduce historic fire intervals, and restore watershed functioning. These treatments must comply with the latest sage grouse guidelines of no more than 20 percent of the acres within eleven miles of a lek being in early seral condition at one time. The USFWS is currently reviewing the sage-grouse again for federal listing and protection under the ESA. Their finding is expected in February 2010. If listed, there will be substantial changes to grazing practices, habitat management, and agency funding priorities.

Three-toed woodpecker (*Picoides tridactylus*): Mortality from competition, insects, and disease in large trees of all species is expected to continue to provide a supply of suitable foraging habitat for three-toed woodpeckers. Forest fires typically lead to local increases in woodpecker populations 3-5 years after a fire (Spahr et al. 1991).

Gray wolf (*Canis lupus*): Trend is increasing in southeast Idaho. As of 2009, gray wolf can be legally hunted, though this may be subject to legal action. Due to the high density of roads and human recreation in the area, wolves are not expected to utilize the watershed to any significant level.

Wolverine (*Gulo gulo*): The wolverine is not known to den within the watershed analysis area. However, a radio collared individual was documented in the area. Alpine cirques and talus slopes are important for den sites but are limited within the watershed. The watershed also lacks a natural connection with ranges to the west and north. Travel corridors are usually located in spruce/subalpine fir forested areas near natural openings with limited human activity and an adequate prey base (prefers carrion) (Ruggiero and others 1994, Groves and others 1997, Spahr and others 1991). The movements of dispersing or spatially unattached wolverine may include lowland vegetation communities generally considered non-typical in nature for wolverine (Copeland, per. Comm.). Trend is not known, due to low population levels and large territories and dispersal areas (Inman 2004). It is suggested that winter track surveys be conducted within the watershed area.

Spotted bat (*Euderma maculatum*) and Townsend's big-eared bat (*Corynorhinus townsendii*): Habitat has increased with underground mines. However, cave and mine habitat can be impacted by human disturbance during critical time periods. Trends are slowly increasing with bat friendly grates on cave and mine entrances. Large diameter snags with loose bark also represents a trend toward greater potential habitat.

Amphibians: Western boreal toad (Bufo boreas) populations appear to be declining in Greater Yellowstone Ecosystem and in other parts of western United States (Groves et al. 1997, 6). Anecdotal information exists for the decline of Northern leopard frog (Rana

pipiens) in Idaho (Groves et al. 1997, 11). It will be important to continue amphibian monitoring which was done in 2000 by Idaho State University.

Big Game (elk & mule deer) & Winter Range: In the watershed and generally across the west, elk populations are increasing while deer populations are decreasing. Conifer invasion is decreasing critical aspen habitats and condition of critical winter ranges is declining. The current elk numbers exceed objectives, despite widespread vehicle access (with few areas more than 1 mile from some type of road), vegetation succession, along with grazing, logging, and urbanization affecting habitats in the zone. Depredation damage complaints from private landowners have increased dramatically in several areas in recent years. The rapidly increasing numbers observed and changes in distribution suggest a highly productive herd (IDFG 2007). The concurrent increase in numbers of elk and decrease in mule deer on some winter ranges has raised concerns about possible competition for forage and/or social intolerance. Livestock operators in several areas have complained about increasing elk use of forage on public land grazing allotments and private lands.

The mule deer population in Analysis Area 20 has fluctuated widely since the mid-1800s. Deer numbers probably declined through the early 1900s, possibly due to unregulated harvest. By 1920, observations of deer were quite rare. Between 1920 and the early 1970s, deer numbers increased dramatically, interrupted briefly by significant winter mortality. Following a significant decline in numbers beginning in 1972, numbers again increased until the late 1980s. The population level attained during this second peak probably did not reach that attained during the 1950s to early 1970s. Overall, mule deer numbers in these units appear to be highly volatile with wide fluctuations over relatively short time periods. Harvest management during the 1950s and 1960s was designed to maintain or reduce deer numbers in response to what was considered over-browsed winter ranges. Following the winter of 1992-1993, when significant winter mortality occurred, harvest management has been conservative (IDFG 2007). It is believed that the quality of mule deer habitat probably peaked earlier in the Twentieth Century.

Of particular concern is the encroachment of human activity, either intense recreational efforts and/or structural developments, in mule deer winter range. Developments from the west side of Pocatello south to Walker Creek in Unit 70 have reduced the potential wintering area for deer. Residential, recreational, and associated development has impacted available deer winter ranges, particularly in Unit 70. These impacts have likely had direct effects on numbers of deer and will be impossible to mitigate. Continued growth of human populations will necessitate the acknowledgment of impacts to wildlife habitat and populations.

The current trend of elk occupying mule deer winter range is a concern. Some winter range in this analysis area does not lend itself to niche separation by the 2 species and, therefore, either direct resource competition and/or social intolerance will likely impact mule deer numbers. IDFG will seek opportunities to minimize the occupancy by elk in key mule deer winter ranges.

Beaver (*Castor canadensis*): Population estimates for beaver throughout the west are 6-12 million animals, a fraction of the original numbers (Olson and Hubert 1994, 2). Nevertheless, beaver have increased within the watershed over the recent past. Beaver activity within the watershed is relative to the amount of available food and construction materials. Beaver dams are found on perennial streams throughout the watershed. Some are inactive or are filling in with sediment. Beaver can and are in some places over-utilizing stream bank vegetation, causing willow or aspen mortality. A decline in nearby aspen stands due to encroachment of conifer or past over-utilization by beaver may limit the long-term sustainability of these beaver populations in certain areas. Fire in many areas which stimulates aspen regeneration will dramatically improve beaver forage.

Avifauna: Avian species populations have varied in response to habitat and environmental base on individual species needs. Executive Order 13186 directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act, provides a framework for the Federal Government's compliance with its treaty obligations, and is intended to enhance coordination and communication. The order also requires Federal agencies "taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations" to develop and implement, within 2 years, a Memorandum of Understanding with USFWS that "shall promote the conservation of migratory bird populations." The protocols developed by this consultation are intended "to be implemented when new actions or renewal of contracts, permits, delegations, or other third party agreements are initiated was well as during the initiation of new, or revisions to, land management plans. At this time the MOU has not been signed.

Recreation and Transportation – (Impacts to wildlife)

Motorized recreation within the watershed area has increased exponentially over the last forty years. Motorized travel, especially cross country can significantly damage habitat areas by impacting vegetation and interrupting water flow, and by disturbing wildlife. However, there is a new travel management plan in place, which closes cross-country travel and limits motorized use to specific routes. This decision is currently being implemented. The most important factor now is enforcement of the existing travel plan by people in the field making contacts.

Range Resources

In general, the range within the watershed looks better today than it did fifty to seventy-five years ago. This is due to significantly lower stocking rates, and better management of the range through timing, duration and rotation (see range section). Nevertheless, the conservation and wise use of range resources is an important factor in the watershed. Of significant concern, however, is the decline of mule deer populations throughout the west. Within this watershed analysis area, winter range is the limiting habitat factor for mule deer, therefore it is critical to maintain in a functioning condition.

Loss of Aspen & Fire Return Interval

The most significant issue in the watershed is the lack of natural fire as a disturbance element to maintain aspen habitat in the environment. A large amount of aspen habitat has been lost or is currently threatened by conversion to conifer. The primary reason for this change is the suppression of lightning ignition fires within the watershed over the last century. Historical fire frequencies in aspen/conifer communities range from 25 to 100 years with 60 years as the median (USDI 2004). Additionally, these fires had a mixed pattern of severity that resulted in a diverse mosaic pattern on the landscape. Currently, fires in these habitats are far less frequent, (>100 years) which increases the potential for landscape-scale events (Miller and Rose 1999).

The difficulty is that to alleviate the issue it is not as simple as suddenly allowing fires to burn in the watershed. The complicating factors include an accumulation of large amounts of fuel, changes in vegetation, noxious weeds, mixed land ownership, wildland-urban interface, and an extensive infrastructure in the watershed, all of which complicate the issue of fire in the landscape. Nevertheless, fire is critical to maintaining aspen habitat within the watershed.

It will be critical to plan, analyze and implement aspen restoration projects where fire is used to reduce fuel loads, minimize future fire risk and act as a disturbance factor to reduce conifers and stimulate aspen regeneration. By reducing fuel loading and minimizing the risk of future catastrophic fires lightning ignited fires can be allowed to naturally burn in some areas of the watershed where private lands and homes are not an issue. Three areas identified in this process for the use of prescribed fire for aspen regeneration include the South Mink area, Gibson Jack area, and the South Scout Mountain Area (Map 1). These areas are currently converting to conifer stands through forest succession and aspen is being lost. The habitat value of the areas for wildlife has significantly declined. Projects should focus on the mortality of conifers within former aspen dominated stands, stimulating aspen suckering and restoring understory forbs and shrubs. Adjacent mountain brush communities that have >15% canopy cover on 30 – 50% of the habitat area, and are not within the historic range of variability for a 20 – 40 year fire return cycle should be included in these prescribed fire projects. Mechanical treatments to stimulate aspen suckering could also be considered in some areas.

Residential Development

Residential development is a significant issue impacting mule deer habitat (IDFG 2008). The US Census Bureau reported that Idaho was the fifth fastest growing state between 1990 and 2000, and is currently the third fastest growing state in the U.S. The total population of Idaho increased an average of 2.0% annually from 1970 through 2008. Residential development has occurred on big game winter ranges within the watershed area and will likely increase on private lands in the future. This makes the existing habitat areas on federal land that much more critical. With increasing human populations in Idaho and increased residential development, it will be all the more important to maintain wildlife habitats in high condition. This can be done through the use of fire, targeted mechanical treatments, closely monitoring grazing utilization and intensity and

the spread of noxious weeds on important habitats, primarily aspen, mountain brush and sagebrush-steppe, within the watershed.

Wildlife Education

Both the Scout Mountain Nature Trail and the Cherry Springs area have been recognized as important nature and birding areas. Currently there are no wildlife viewing signs (white binoculars on a brown background) on the local highways or interstate. There are excellent opportunities to promote birding and nature observation and educate the public on important ecosystem processes within the watershed, including the role of fire on the landscape and the importance of beaver as a keystone species within the watershed.

RECREATION

Recreation use ties directly to population trends. The Intermountain West continues to grow in population. According to the latest census data, Idaho's population has increased over 25% since 1990. Bannock County's population has grown over 6% since 2000. Technology will continue to change the nature of recreation activities and recreation travel. The close proximity of the project area to a large and relatively young population will ensure new recreation pursuits and technology will occur on the front country of Pocatello.

Recent outdoor recreation activities that did not exist fifteen years ago include geo-caching, UTV travel and paint-gun use. Cell phone communication, GPS units and the availability of information via the internet has also changed recreation behaviors, making people more informed and connected to one another. As use increases, there will be a greater demand for improved recreation information on the ground and on our Forest website.

Developed and Dispersed Camping

Camping use at Scout Mountain Campground appears to be increasing, based on the last five years of fee data. Increase in fees could also be attributed to better fee enforcement and longer season of fee collection. Scout Mountain Campground is only used to capacity on the summer holiday weekends of July 4th, July 24th (Pioneer Day) and Labor Day. The 10-unit picnic area was recently converted to overnight camping, and serves as an overflow when the main campground is full. The former picnic area sites were enlarged in 2008 to accommodate larger recreation vehicles.

Based on District staff observations, dispersed camping also appears to be on the increase. This could be attributed to several factors, including the gas price increases of 2006, which set the pattern of camping closer to home. In 2008 the State of Idaho restricted vehicle access onto the East Fork of Mink Creek state section, which had been heavily used for dispersed camping. Based on public comments and discussions with campers, the state closure displaced many campers to the South Fork of Mink Creek. The "Pine Plantation" area, located within the South Fork of Mink Creek, receives heavy use from early spring to late fall.

Winter Recreation

Revenue from the Park N' Ski Program has increased over the last three years, but this is most likely due to increased enforcement of the sticker program. Ski use at the East Fork of Mink Creek Nordic Center has increased in the last few years due to late spring snow and improved marketing. Snowmobile use appears to be static, and heavily dependent on good snow conditions.

Transportation and Trails

Bannock county population will continue to grow, and road and trail travel within the analysis area will also increase. Increased use and technology will increase the demand for improved road and trail information, route and way-finding signage and improved road and trail conditions.

The existing trail system is not connected to distribute trail users throughout the system. The City Creek system suffers from over-use and crowding and is not well connected to the lesser used Mink Creek trail system. The Walker Creek to Goodenough Canyon ATV trail is not connected to ATV trails within Mink Creek. This has contributed to illegal route travel over the mountain in several locations.

Motorcycle trails are often illegally traveled by ATVs if terrain permits. Motorcycle and mountain bike users do not want designated single-track trails turned into double-track trails. Some single-track trial enthusiasts want more single-track trail opportunity. Some designated motorized trails are not accessible due to loss of access through the Walker Creek private land. Some routes are designated as ATV trails but are not currently designed for ATV use, such as the Lead Draw Trail. These observations are based on discussions with various trail users and the PTMA.

Some Forest roads receive mixed-use, meaning sedan and truck travel mixing with ATV and motorcycle travel. The South Fork of Mink Creek road receives mixed-use by full-sized vehicles, ATVs and motorcycles. This use can be a safety concern as road and trail use increases.

Hunting, Fishing and Gathering Forest Products

In the immediate future, the area will continue to receive heavy use from big game and upland game hunters during the fall and early winter, depending on hunter success and animal numbers.

Based on Idaho Fish and Game user surveys, there is an unsatisfied demand for local fishing opportunities within the analysis area.

Increased firewood gathering is expected to continue for the next few years. The supply of dead and down trees for firewood permits is limited within the analysis area. Many firewood permit holders have reported difficulty in finding wood and some areas have suffered illegal cutting of green trees.

Based on Christmas tree customer comments, there is a demand for Christmas tree cutting within the analysis area.

CULTURAL RESOURCES

The Shoshone-Bannock Tribes will continue to utilize the analysis area. Tribal staff is becoming more educated and experienced in working with Federal land management issues. The recent reaffirmation of Executive Order 13175, consultation and coordination with Indian Tribal Governments, Forest Service Manual 1563 direction, and additional consultation mandates indicates that coordination with the Tribes will continue an upward trend.

Important archaeological and historical resources continue to be impacted by human use.

RECOMMENDATIONS

SOILS AND GEOLOGY

Purpose
To bring the results of the previous steps to conclusion by focusing on management recommendations that are responsive to watershed processes identified in the analysis
To document logic flow through the analysis, linking issues and key questions from Step 2 with the Step 5 interpretation of ecosystem understandings.
To identify monitoring and research activities responsive to the issues and key questions
To identify data gaps and limitations of the analysis.

- Control resource impacts from dispersed camping along the 163, 520 and 521 Rds (S. Fork Mink Creek Rd and spurs) by defining campsites and continuing to close and obliterate non-system ATV trails and roads. The ponderosa pine plantations were identified as having the most impact from soil compaction, erosion and disturbance. Possible management actions could be to rest some camping areas to allow healing while restricting others by barriers.

- A dispersed camping area on a closed road just north of the 009 road should be closed with barriers, obliterated, and seeded. This area has erosion occurring and the road is steep to access this spot. The closed trails that can be accessed by this dispersed area are still being used illegally.

- Maintain road 344, Box Canyon Road, by establishing drainage and out-sloping road where practicable. These soils on this road are very susceptible to erosion and gravelling the road surface would greatly reduce erosion effects from this road.

- Sign and establish drainage on the segment of 006 Rd from where it turns from gravel to native surface to Crystal Creek. The short spur near 513 Rd also is in need of drainage. Deep silt loam soils in this area have low strength when wet, which has led to ruts and erosion. A gate could also be useful where the road changes from gravel to native surface. If funds are not available to surface this road with gravel, use gates to control seasonal access.

- Evaluate need for a 0.6 mile spur road that takes off from the point where 006 Rd turns from gravel to native surface. This spur dead-ends at a dispersed site. It does not show on the current travel map and if not needed should be rehabilitated by ripping and seeding.

- The 044 ATV trail from the end of the 006 Rd to Elk Meadows is rapidly eroding (about ¼ mile) on steep slopes. An alternative alignment could be considered to make this segment more sustainable.

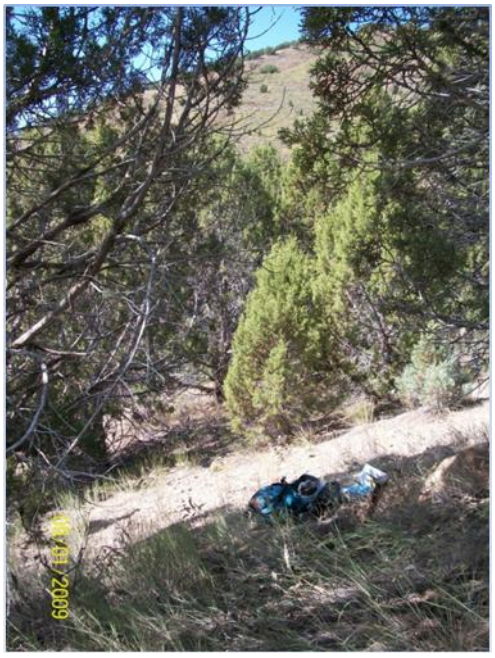


Photo 48: Juniper canopy cover in Mink Creek canyon.

- The travel map could be adjusted to better reflect conditions on the ground for routes 276, 281, 003, 280 and 290. Most of these roads are probably too steep for trucks, some segments are non-existent, and at least one trail has been physically closed.

- Trail 192 up to the warming hut has erosion occurring and has caused the ATV use to create another parallel trail. This trail segment should be repaired or rerouted.

- Assess the need for a watershed improvement project on the ridge above the Nordic Ski area. Gullies have formed and should be controlled with gully plug structure of rock or trees. All trails in the area have drainage and erosion and determine which ones may need some re-routing.

Photo 49: Ridge above the Nordic Ski Area with gullies forming

- There may be potential for additional fuels treatment to thin the Juniper canopy cover and mountain bush cover in the watershed on slopes less than 40% that occur on stable soils. Thinning these cover types could encourage a larger component of existing native grasses and shrubs which would likely make the site more resilient and less susceptible to cheatgrass invasion if a wildfire burned the area. This was evident with the treatments completed this year in Blind Spring.

- Range management issues were noted in Walker Creek and Indian Creek due to intense grazing pressure. These areas should be reviewed for future changes to allow these areas to recover. See Range recommendations for resolution.

Range looked well managed over most of the watershed. The only upland range effects noted on the west side of this range was some minor pedestalling of shrubs in a mountain brush community was noted near South Fork Mink Creek in the Pocatello allotment. Location is T8S R34E NE1/4 Section 25. This is a resilient, productive site, and this pedestalling was of minor extent.

Photo 50: Mountain Brush type west of Mink Creek.

- Consider closing trail 193 above the junction of trail 195 that accesses Old Tom Mountain. This trail is very steep along the ridgetop and has not been maintained. It dead ends at the top of the mountain. If it is not closed, it is recommended that drainage is constructed into the trail to prevent further erosion.

- Consider closing the trail in Indian Creek since no public access is allowed at the forest boundary. In addition, Trail 184 is a constructed ATV trail about 2 miles from the trailhead but then turns into a motorcycle, one-track, trail. This area needs signs to show what kind of motorized use is allowed.

- Consider fencing the wetland/bog area in Elk Meadows to protect it from livestock trampling. These hydric soil areas are rare and very limited in extent on the Forest and should be protected.

- Reconstruct trailhead for Trail 142 on the South Fork of Mink Creek and assess the need for relocating sections of this trail to reduce erosion into South Fork Mink.

Photo 51: Inadequate trailhead at for Trail 142 on the South Fork of Mink Creek.

Geology and Minerals

Based on the limited amount of known fossil material present in the watershed, the general fragmentary nature of fossils present, the low demand for the types of fossils present, and potential safety concerns associated with collection from known sites, it is recommended that efforts to develop public collecting sites should not be pursued at this time.

Because there is a constant need for road surfacing and fill materials, if costs become too high to use commercial sources, it may be necessary to look for sources for in-service use in the watershed. Such sources should be relatively close to existing roads, close to areas where future application may be necessary, be in areas where extraction and possible storage could be done without excessive environmental concerns, and where these materials could be extracted safely. This could include pit-run gravel sources, sites for crushing, or rip/rap and barrier rock sources. Randy Tate, former FS engineer familiar with the area, said a potential source of limestone for crushing does exist near the head of Corral Creek (Tate, personal communication, Nov. 2009).

Although rocks for landscaping purposes are available from nearby commercial sources and/or BLM lands, such resources also occur in the watershed on NFS lands. However, it is not recommended that mineral material resources on NFS lands be made available for commercial or private uses because of potentially limited materials available in the area, potential impacts to other uses/resources, existing sources for these materials are available from commercial interests or on BLM lands, and because of potential safety concerns associated with development of this resource in the watershed.

There have been recent inquiries about allowing suction dredging in Mink Creek. If gold prices stay relatively high, there could be an increase in such requests. Streams in the watershed are currently closed to the State's "one-stop" recreational suction dredging permit process. It is recommended that the area streams on NFS lands remain closed to the "one-stop" permits because of the potential impacts to and conflicts with other resources and uses, the very limited value of gold expected to be found in the watershed,

and because the area would still remain open to the State's long-form application process if someone really wanted to pursue that activity.

WATER

The acid test of our understanding is not whether we can take ecosystems to bits and pieces on paper, no matter how scientific, but whether we can put them together into practice and make them work." *- A.D. Bradshaw*

The following recommendations are made with the goal to improve stream channel and riparian area health, water quality, and watershed function.
Site-specific recommendations:

- Implement the Caribou Riparian Grazing Implementation Guide (GIG; Leffert 2005) to provide site-specific use standards. A Caribou RFP (USDA FS 2003) standard is that "The most current version of the Caribou Riparian GIG shall be used for the primary source of direction for grazing in Forest riparian areas and shall be incorporated during allotment management planning." Based on the GIG and evaluation by the District Rangeland Resources Specialists and team Hydrologist, the stared ("*") use standards listed in Table 3 should be incorporated into the 2010 annual operating instructions (AOIs) for the area allotments.

Table 37: Recommended riparian use standards based on the Caribou Riparian GIG (Leffert 2005).

Allotment	Drainages	Greenline SH (in) (E/M/L)	Woody Species Utiliz. (%) (E/M/L)	Bank Alteration	Riparian SH (in) (E/M/L)	Riparian Forage Utiliz. (%) (E/M/L)	GIG Comments
Birch Creek (S&G)	Mormon Canyon & Rowe Creek	4/5/6	50/40/35	15%*	4/5/6	45/35/20*	FAR-High; Sediment TMDL. A4 stream type = SG-02.
	Cottonwood, Lost, & Birch Creeks	2/3/5	50/50/50	25%*	2/3/4	65/55/45*	Cottonwood = PFC. A4 stream type = SG-02
Michaud (C&H)	Trail Creek & Michaud Creek	4/5/6	50/45/40	15%	3/4/5*	55/45/35	FAR-High (2009). B4a stream type = SG-05
Midnight (C&H)	Midnight & Birch Creeks	3/4/5	50/50/40*	20%*	3/4/5	55/45/35*	Midnight Creek is PFC. Birch Creek is 303(d) listed for sediment and fecal coliform. YCT stream. B3 stream type = SG-04
	Crystal, West Fork Mink, & Clifton Creeks	5/6/8	50/40/30	15%*	4/5/6*	45/35/20	Crystal is FAR-mod (2009); West Fork Mink Creeks is PFC. YCT stream. Crystal Creek Stream type = B4 (headcut to BLM) & F5 (road to headcut: upper). SG-05.
Old Tom (S&G)	Garden Creek	4/5/6	50/40/35	15%*	4/5/6	45/35/20*	TMDLs for sediment, nitrogen, and phosphorus. Assume A4 stream type = SG-02. PFC rating unknown; assume FAR-high to mod.

Allotment	Drainages	Greenline SH (in) (E/M/L)	Woody Species Utiliz. (%) (E/M/L)	Bank Alteration	Riparian SH (in) (E/M/L)	Riparian Forage Utiliz. (%) (E/M/L)	GIG Comments
Pocatello (C&H)	Walker Creek	6/8/8	30/20/15	10%*	4/5/6	45/35/20*	Walker Creek = FAR (Mod from boundary to ATV crossing; High above ATV crossing: 2009). South Fork Walker = PFC. C4 Stream type = SG-08. YCT stream. Sediment impaired.
	Indian Creek	5/6/8	50/40/30	15%*	4/5/6	45/35/20*	Indian Creek = FAR. B4 Stream type = SG-05. YCT stream.
	Bell Marsh & Good Enough Creeks	4/5/6	50/45/40	15%*	3/4/5	55/45/35*	PFC. TMDLs for sediment, nitrogen, and phosphorus on Good Enough Creek. Sediment TMDL on Bell Marsh. B4 Stream type = SG-05. YCT stream.
	Kinney Creek, Lead Draw, lower East Fork Mink (Lower Cow Camp & Kinney Units)	6/8/8*	30/20/15	10%	4/5/6*	45/35/20	Kinney Creek & East Mink Creek = FAR (2007). TMDLs for sediment, nitrogen, and phosphorus. Kinney and East Fork have C4 stream types = SG-08. East Fork is YCT streams.
	Lower South Fork Mink & Corral Creek (Highway Unit)	4/5/6	50/45/40	15%*	3/4/5	55/45/35*	South Fork = PFC (2009). Stream type = B4 = SG-05. TMDLs for sediment, nitrogen, and phosphorus. YCT streams.
	Upper South Fork Mink, Box Canyon, & Bull Canyon (Catch, Unit 6, & Big Units)	6/8/8	30/20/15	10%	4/5/6*	45/35/20	Upper South Fork Mink = FAR-High (2009). TMDLs for sediment, nitrogen, and phosphorus. South Fork & East Fork Mink are C4 stream types = SG-08. East Fork & South Fork are YCT streams.
	Upper East Mink (Upper Cow Camp)	4/5/6	50/45/40	15%*	3/4/5	55/45/35*	Upper East Fork Mink = PFC (2007). TMDLs for sediment, nitrogen, and phosphorus. East Fork Mink are B4 stream types = SG-05. YCT streams.

Allotment type: S&G= Sheep and goat; C&H = Cattle and horse
Standards: SH = Stubble height measured in inches; E/M/L = Early, mid, and late season grazing. The exact dates of "early", "mid", and "late" can vary between Forests or even years. Therefore, they are not specified. For the Caribou NF however, "early" is usually defined as the beginning of the growing season to mid July; "mid" season from mid July to mid August; and "late" season from mid August to the end of the growing season.
Comments: YCT= Yellowstone cutthroat; PFC = properly function condition, FAR = functioning at risk; NF = non-functioning; TMDL = a total maximum daily load is developed for specific pollutants after an assessment unit is 303(d) listed

- Relocate livestock watering sites that are located near streams outside of the AIZ as opportunities arise (e.g. during replacement or heavy maintenance). Establish new sites so that runoff and sediment is not delivered directly to water bodies during storm events (Photo & Photo).

Photo 52: Blind Springs livestock trough located immediately adjacent to stream channel.

Photo 53: Trough in Valve House Draw; overflow & sediment is routed directly into intermittent stream channel.

- Incorporate into the Allotment Management Plans (AMPs), objectives for the attainment of desired conditions for riparian areas and stream channels. Here are recommended objectives for locations that presently have riparian DMAs:
    - Crystal Creek (Elk Meadows/Clifton): Maintain bank stability above 80% (81% in 2009); improve ecological status from early seral (2009) to mid seral by 2014 and late by 2019.
    - Indian Creek: Maintain bank stability above 80% (81% in 2006); improve ecological status from early seral (2006) to mid seral by 2011 and late by 2016.
    - Kinney Creek: Improve bank stability from 51% (2008) to 70% by 2013 and to 80% bank stability by 2018.
    - South Fork Mink Creek (Catch Unit): Improve bank stability from 39% (2006) to 60% by 2013 and to over 80% bank stability by 2018; measure channel substrate (pebble count) during the next MIM reading.
    - South Fork Mink Creek (Unit 6 exclosure): Maintain bank stability above 90% (96% in 2006); measure channel substrate (pebble count) during the next MIM reading and use that to define objectives for the Catch Unit DMA on South Fork Mink Creek.
    - Walker Creek: Improve bank stability from 54% (2008) to 70% by 2013 and to over 80% bank stability by 2018; improve the ecological status from early seral (2008) to mid seral by 2013 and late by 2018; reduce the percent fines in the channel substrate from 38% to less than 25% by 2015.
- Improve aquatic organism passage (AOP) and decrease sediment delivery to Walker Creek at the two stream crossings on the Walker Creek Road. Evaluate the options of either 1) upsizing both crossings or 2) relocating the road to eliminate the need for both stream crossings. Also continue work with the local Soil Conservation District

(IASCD) and NRCS on private land downstream of Marsh Creek Road to fix a headcut and improve AOP on private land.

Photo 54 & Photo 55: Lower crossing on Walker Creek during spring runoff (4/20/2009). Road runoff and sediment are delivered directly to stream. Culvert also restricts aquatic organism passage (opening is less than bankfull width).

- Restore Mink Creek within the Bannock Creek Guard Station area. The reach was historically straightened and relocated along the present horse pasture. Reference conditions up and downstream include a meandering channel that is less entrenched; this reach resembles a ditch. Mink Creek has sediment and phosphorus TMDLs. Improving streambank stability would limit the amount of sediment and phosphorus entering Mink Creek. The project most include assessment of flooding concerns to the Guard Station site, maintaining a acceptable horse pasture, and evaluation of the CCC constructed stream crossings.

Photo 56 & Photo 57: Straightened reach of Mink Creek near horse pasture. Unstable streambanks are a sediment source.

- In combination with the stream restoration project at Bannock Guard Station, the "bone yard" constructed in 2007 will be evaluated for restoration opportunities. The bone yard was constructed within the AIZ and possibly within a potential wetland without any hydrology input or evaluation of permit requirements. Examine the possibility of relocating or at least decreasing the current size to better meet AIZ needs. RFP guidelines for the AIZ include: "Avoid locating facilities… corridors in AIZs."

Photo 58: Bone yard shortly after construction (fall 2007). Mink Creek runs immediately behind the lot.

Photo 59: Bone yard was constructed within the Mink Creek AIZ. Mink Creek is on photo right. Runoff and sediment from lot is delivered via the drainage ditch directly to the stream channel during high runoff events.

- Improve the City of Pocatello's diversions structures at Gibson Jack Creek and the Valve House along Mink Creek to allow for aquatic organism passage (AOP). The Gibson Jack diversion has a large drop that impedes passage. The trail bridge immediately downstream of the diversion should also be enlarged to better accommodate high flow events. The Valve House is located immediately upstream of the confluence of Mink Creek and West Fork Mink Creek. Both streams have concrete flumes and large drops (falls) that impede AOP. In addition, the culvert on West Fork of Mink Creek on the Bannock Scenic Highway should be upsized for flow and AOP.

Photo 60: Gibson Jack diversion during runoff in 2009.	Photo 61: Undersized trail bridge on Gibson Jack Creek.
	
Photo 62: Large drop on Mink Creek below Valve House.	Photo 63: West Fork Mink Creek at Bannock Highway.
	

- Upsize all fish-bearing stream crossings on the South Fork Mink Creek to improve AOP and decrease sediment delivery to the stream. These include four crossings on the South Fork Mink Road and one crossing on the Box Canyon Road. An interdisciplinary team (fisheries, hydrology, recreation, and engineering) has evaluated the crossings and recommended following treatments. All but one crossing will be upsized and improved at the current site. The lower crossing however will include approximately ¼ mile of road relocation to eliminate flooding of road by beaver ponds. The nearby motorized trailhead will be improved and the trail will be reconstructed will switchbacks to reduce erosion. The old road will be restored as part of the floodplain.
  - Priority 1: The two lower (northern) crossings on FSR 163 are barriers to aquatic passage. Large drops and excessive erosion indicate that both culverts are undersized (Photo & Photo). At the lower culvert (northern most crossing), beaver activity causes seasonal flooding of the road (Photo). Minor road relocation is planned to elevate the road onto the hillside and eliminate the flooding risk. The old road surface would be obliterated and converted to floodplain. The new road would cross slightly downstream of the existing crossing. Access to the nearby trail would

also be maintained. The second crossing will simply be replaced with a larger structure to provide for aquatic organism, flood, and debris passage.

Photo 64: Lower culvert on South Fork Road.	Photo 65: Beaver activity at lower culvert.
	

Photo 66: Second culvert on South Fork Mink Road is a barrier to aquatic passage due to jump height.

- Priority 2: Two crossings further upstream (south) on FSR 163 need replacement from and engineering and safety standpoint. The first crossing has inadequate fill over the two side-by-side culverts; the culverts have also been damaged by road graders (**Photo**). The second crossing is also slightly undersized. Both crossings would be replaced at the same location with larger structures.

Photo 67: Undersized crossing with inadequate fill; damaged.

Photo 68: Upper crossing on FSR 163 is undersized.

- Priority 3: The third crossing is on FSR 344 (Box Canyon). This crossing is constantly affected by beaver activity. Plugging of the culvert in the spring of 2008 resulted in flooding impacts to both FSR 344 and FSR 163. The culvert is planned for replacement in 2010 with a larger structure designed to minimize impacts from beavers.

- Improve the crossing of Mink Creek at the Valve House Draw Trail. Although this is a lower priority, the existing box culvert should be upsized to better accommodate AOP and flood flows. The trail is also a maintenance level one road (full-size vehicles may travel the road for administrative purposes).
- Improve the West Fork Mink Creek stream crossing on the West Fork Trail. The culvert is undersized and water is running around it on both sides. An armored ford or bridge should be constructed at this site. The bridge further up in the drainage was recently rebuilt, but may need replacement soon. The engineering shop is currently working on a design for that bridge.
- Establish more riparian grazing designated monitoring areas (DMAs) for multiple indicator monitoring. New DMA locations should include: South Fork Mink Creek (in Highway unit, possibly below first culvert), Midnight Creek, and the Michaud Allotment (Trail or Michaud Creek). Use data to define site-specific objectives.
- Continue stream channel PFC evaluations. Priority areas include Goodenough Creek, Bell Marsh Creek, Lead Draw, Garden Creek, Birch Creek (Old Tom Allotment), and Box and Bull Canyons. Evaluate the need for riparian grazing DMAs during PFC assessment.
- Evaluate a wetland restoration and/or aspen improvement project at Corral Springs Pond. Larry Fitch said that this pond was built by the rail road and the CCC improved the springs with a pipe. Albert Witworth said aspen in the area have deteriorated due to excessive use by beaver.

<u>Area-wide recommendations:</u>

- Perform a beaver habitat inventory to assess beaver suitably within the analysis area. The inventory shall include an evaluation of the existing and potential beaver habitat. Use that data to recommend treatments to improve beaver habitat near streams. Unless otherwise determined during the inventory, treatments should focus on smaller tributary drainages (e.g. Bull Canyon) because the larger drainages typically have current beaver activity. For example, Mink Creek, South Fork Mink, and East Fork Mink have a fair amount of beaver activity. Habitat improvements should focus on smaller drainages where aspen stands are degrading and abandoned beaver dams are evident. Emphasize work on improving habitat rather than transplanting beaver. The idea being, create the habitat and beaver will naturally move in from existing populations on the larger streams.
- Control motorized recreation as described in the Caribou NF Travel Plan. Obliterate user-created routes. Soils report contains several site-specific recommendations.
- Control dispersed camping. Soils report contains several site-specific recommendations.
- Improve road and trail maintenance. Empahsize improving road drainage features, not just graveling. Please refer to photos below.

Photo 69: Erosion on the Box Canyon Road.

Photo 70: Erosion of trail in Nordic Center area.

- Evaluate winter salting operations on the East Mink Creek Road and winter sanding operations on the Bannock Scenic Highway to identify if improvements can be made to protect water quality.
- Repeat several stream channel cross sections in the analysis area that were originally established in the late 1980's and early 1990's. Streams include Bell Marsh, East Mink, Garden, Gibson Jack, Goodenough, Indian, Mink, Rowe, South Mink, Walker, and West Mink Creeks.

VEGETATION

Forested Vegetation

Areas of decadent mountain brush species at high densities exist within the watershed. Even though projects proposed for vegetation manipulation have been implemented in this area, it is still over-dominated by mature age structures. Within the South Fork of Mink Creek drainage, many mountain brush areas could benefit from a low-moderate severity prescribed fire to regenerate mountain brush and promote a diversity of age classes within the watershed. Prescribed burns will also maintain early seral species composition of in the vegetation community.

Many aspen stands are being encroached upon by conifer within the watershed assessment area, increasing the concern and priority of aspen maintenance and regeneration. Aerial photo interpretation of mid 20th Century photos and current photos indicate that conifer in aspen clones are increasing and that conifer cover has significantly shifted to dominating aspen/conifer stands where conifer cover was historically less. The South Fork of Mink Creek, as well as the upper and lower reaches of Box Canyon and Bull Canyon, are areas of concern where conifer dominance in stands may threaten future aspen resilience if trends continue (See historical aerial photos in this document). The majority of this conifer is mature and around 100 yrs old. Other identified stands of aspen regeneration concerns are Elk Meadows, Horse Lake, as well as the Clifton Creek, Corral Creek, and the upper reaches of Crystal Creek Drainages. Aerial photo interpretation between 1963 and 2001 exhibited increases in conifer cover in aspen/conifer and seral aspen stands within these areas. Treatments should be focused on decreasing conifer in seral aspen stands and seral aspen and returning conifer in aspen/conifer stands to near historic levels. Consider prescribed burning and mechanical activities to meet aspen regeneration requirements while creating some dead, large diameter conifer snags and maintaining live large diameter conifer for snag recruitment.

Continuation of the Gibson/Slate project, encompassing the 400 acre West Fork Prescribed fire, will be beneficial for continually addressing aging structure and species composition within watershed woodlands. Projects like this will also protect future resource values as fuel loads are reduced, making wildfire in juniper-dominated stands more manageable in this watershed.

Bell Marsh Creek, Walker Creek, and the South Fork of Walker Creek are increasing in juniper density on south-facing slopes typically dominated by sagebrush and mountain brush communities. Douglas fir, subalpine fir, and rocky mountain juniper cover types are also increasing in these drainages within areas that were dominated by aspen 40 years ago. These areas should be prioritized to promote elk and deer winter range areas and semi-primitive recreation on the District.

At a future date, additional juniper treatments may be beneficial near Cherry Springs Nature Area and Slate Mountain to improve vegetation structure and composition while

providing safety for firefighters and public property near the forest boundary. These treatments will make wildfire more manageable in the watershed and be analyzed prior to implementation.

- When mechanically treating aspen stands to prep for prescribed burns, advertise to the public to encourage firewood gathering at the site. The Westside Ranger District is planning to do a prescribed burn in the South Fork of Mink Creek. The area to be treated is between the Box Canyon road and the Scout Mountain Top road. If the decision goes through, we will begin preparing the area this summer. The project will be similar to the Blind Springs project. The conifers in and around the aspen stands will be cut using chainsaws. As with the Blind Springs project, we could advertise this to the public and allow them to harvest firewood.
- Under special circumstances, such as the above bullet statement, the public could be allowed to cut down and harvest green conifers where they are in or immediately adjacent to aspen stands to assist with preparing burn units for prescribed burns.
- Use prescribed fire along with mechanical treatments to improve aspen stand regeneration, and halt the conifer encroachment.
- Do an assessment of the analysis area to determine if it has the resources to support public firewood harvesting.
- Continue monitoring aspen and conifer stands for age class, snags percentages, and old growth.

Non-Forested Vegetation

- Support a fuels project within the analysis area to treat areas of sagebrush with greater then a 25% canopy cover. (RFP 3-18)
- Establish big game winter range designated monitoring areas (DMA's) within each allotment. Allotments that apply include: Michaud C&H and Pocatello C&H (Lead Draw/ Kinney Creek, Walker Creek, and Belle Marsh units).

Fire

- Use prescribed fire along with mechanical treatments (i.e. mastication, felling) in areas of heavy fuel loading to reduce the risk of uncontrollable wildfire. This will be increasingly important in areas where the Wildland Urban Interface can be expected to grow such as, Gibson Jack and the East Fork of Mink Creek.
- Use prescribed fire along with mechanical treatments in sage brush/shrub communities where the communities are outside their historical range of variability. The Revised Forest Plan for the Caribou National Forest describes the historical range of variability for sage brush/shrub communities as having 30 to

50 percent of the shrubs in greater than 15 percent canopy cover class (RFP, 2003).

- Continue monitoring the sage brush/shrub communities for percent canopy cover, and increases in fuel loading in the analysis area.

RANGE

- Livestock and Recreation conflict
    - Public Awareness signing at trailheads, campgrounds, and public information kiosks illustrating examples of "close the gate" signs. Inform the public that Forest Service lands are multiple use and cows may be encountered in areas of the watershed, with a map detailing those areas.
    - Develop and have new "close the gate" signs printed to indicate to the public the importance of keeping gates closed to protect natural resources. An example might be: "Close the gate to protect your favorite fishery" or "For resource protection please close the gate".
    - Coordinate with Bannock County Road Department to have "open range" signs placed on the Bannock Highway at the Forest Boundaries.
- Implement vegetative recovery requirements to predict when livestock grazing should be reinstated following prescribed fire on the Caribou National Forest.
    - CNF RFP 3-42: Livestock grazing shall be restricted following prescribed fire or natural fire and/or rangeland planting or seeding before seed set of the second growing season, or until the objectives of the treatment are achieved.
        - Vegetative recovery requirements include but are not limited to and may vary on a project specific basis:
            - 85% of desired herbaceous perennial plants are producing seed (professional judgment).
            - Palatable vegetation should have developed root systems extensive enough to provide for soil stabilization and prevent uprooting when grazed.
            - Evaluate the success of the burn objectives. Were the objectives met and how would grazing effect those objectives?

- A standard in the Caribou RFP is: "Livestock grazing shall be restricted following prescribed or natural fire and/or rangeland planting or seeding before seed set of the second growing season, or until the objectives of the treatment are achieved." The objective of this standard is to restrict livestock grazing until <u>at least</u> after seed set of the second growing season. To more clearly define treatment objectives, recommended generic protection measures should include:
    - Uplands: restrict grazing until ground cover returns to 80% of pre-project conditions.
    - Riparian: restrict grazing until ground cover returns to 80% total ground cover or to pre-project amounts, whichever is less.
    - The preferred method of grazing "restriction" is rest, especially until seed set of the second growing season. Adaptive management may be used as well. The District Rangeland Specialist should gather input from the allotment permitee(s) and an interdisciplinary team (water, aquatics, wildlife, and soils) to develop a grazing strategy to restrict grazing.

Additional administrative measures may include a reduction in numbers and duration, timing adjustments, and a range rider. Structural methods may include temporary fencing. Monitoring shall be conducted to measure ground cover recovery and to determine if adaptive management changes are necessary.

- Define riparian grazing standards for each pasture unit using the Grazing Implementation Guide (GIG) refer to the hydrology recommendations.
- Establish designated monitoring areas (DMA's) in riparian areas using the multiple indicators monitoring (MIM) protocol in the Pocatello C&H –Highway unit along the South Fork of Mink Creek; Midnight C&H along Midnight Creek; and in the Michaud C&H along Trail creek or Michaud Creek.
- Conduct a NEPA analysis for the Midnight/ Michaud Management Area (Midnight C&H and Michaud C&H) and the Pocatello cattle allotment in 2011.
- Perform proper functioning condition (PFC) assessments in Box Canyon, Bull Canyon, Good Enough Creek, Belle Marshe, Lead Draw, Garden Creek, and Birch Creek (Old Tom/Birch Creek S&G). The need for establishing additional DMA locations will be evaluated at that time.
- As per soils recommendations, fence the approximately ½ acre area of histisol soils in Elk Meadows for resource protection. The labor can be performed by the Youth Conservation Corps (YCC).
- As addressed in the soils recommendations, management of the Walker Creek and Indian Creek drainages will be adjusted for the 2010 grazing season. Cattle within the Pocatello C&H-East herd graze that area. Typically the grazing rotation is from north to south beginning in the Walker Creek/Indian Creek area. For the 2010 season, cattle will be grazed in a south to north rotation and not enter the Walker /Indian Creek area until late summer. Plants will be at a later phenological stage and there will be less moisture in riparian soils for compaction.

FISH

Through this analysis, many actions have been identified that would directly or indirectly benefit aquatic resources in the Lower Portneuf River, Garden Creek-Marsh Creek, and Lower Bannock Creek watersheds. While some of these recommendations are to collect more data, others are for restoration actions.

Additional Data Needs

- Incorporate the Caribou Riparian Grazing Implementation Guide (GIG; Leffert 2005) direction into the 2010 annual operating instructions (AOIs) for Forest livestock permittees. Implement site-specific riparian use standards found in the Hydrology Recommendations.
- Install riparian designated monitoring areas (DMAs) using the multiple indicator monitoring (MIM) protocol on all fish bearing and perennial streams in the analysis area. Monitoring priority should be given to streams that contain Yellowstone cutthroat trout including Midnight, Mink (plus all tributaries), Walker, Bell Marsh, and Goodenough creeks.
- Determine if there is a physical feature that segregates the native fish from non-native fish in lower Gibson Jack, upper Mink, East Fork Mink, and Bell Marsh creeks. If there is, there may be an opportunity to significantly decrease the number of non-native fish in these streams through piscicide application.
- Determine if or to what extent non-native fish colonization or seasonal use occurs on the lower reaches of Marsh Creek tributaries located on private lands. Conduct coinciding habitat inventories to determine if these tributaries provide seasonal refugia for fluvial fish. Perform AOP inventories, IDFG diversion inventories, and spot sampling on lower reaches to determine if longitudinal gradients exist in species composition.
- Determine if YCT still inhabit City Creek.
- Conduct ANS inventories, with a focus on the spread of NZ mudsnail throughout the Portneuf River and Marsh Creek tributaries. Focus on tributaries popular with anglers
- Review cattle grazing on East Mink, South Fork Mink, and Walker creeks and change management if there are still problems with overgrazing and bank trampling.
- Utilize the Beaver HSI protocol adapted by Mabey (2000) to survey streams to determine beaver distribution and identify habitat conditions.

- Improve beaver habitat by gathering an IDT to develop and implement projects that focus on regenerating aspen stands at the watershed scale.
- Perform fish distribution surveys on Bannock Creek tributaries including Michaud, Birch, Midnight, Crystal, and Clifton creeks on good water years to investigate expansions of fish populations. In conjunction with fish sampling, conduct range and aquatic habitat monitoring to determine if current range management is impacting stream banks and fish habitat.
- Explore the need for Valve House Road/Trail crossing and road corridor. Consider obliterating the road and relocating the trail out of the riparian.
- Initiate partnerships with the Shoshone Bannock Tribes regarding fish sampling and beaver monitoring. In 2011, expand fish distribution surveys and knowledge by integrating crews and resources.
- Review Corral Springs area to determine how to address the grazing impacts identified by DEQ.

Restoration Actions

- Yellowstone cutthroat trout conservation strategies within the entire Portneuf River and Marsh Creek drainages should focus on controlling nonnative trout expansion. Initiate control efforts in lower Gibson Jack, upper Mink, East Fork Mink, and Bell Marsh creeks.
- Work with partners including the Carriboo Conservancy, IDEQ, IDFG, TU, City of Pocatello, and water users to initiate water conservation projects and promote higher in-stream flows for the Portneuf River.
- Fish barriers occur at Mink Creek (Valve House), South Fork Mink Creek (lowest crossing only), West Fork Mink, and Gibson Jack Creek (City Diversion). These structures are apparently excluding non-native fish from migrating upstream. If these barriers are removed for hydrologic reasons, barriers should be replaced to continue to exclude non-native fish.
- Replace stream crossings that are undersized, contributing to channel instability, and inhibiting aquatic organism passage (AOP). During restoration it is preferable to utilize bridges or stream simulation crossings. During planning, determine fish distribution and protect against facilitating further upstream expansion of non-native fish populations.

  Cherry Springs Nature Area (Mink Creek) – Replace two perched trail culverts with trail bridges and improve bank stability by restoring streambank vegetation.
  East Mink Creek – Replace stream crossing located on FSR 524 near the state land.
  West Mink Creek – Work with the Highway department to replace the culvert under Bannock Hwy. Replace trail culvert with a new trail bridge.

South Fork Mink Creek – Replace all five stream crossings associated with FSR 163 and FSR 344. Relocate the lowest crossing and realign the lower section of FSR 163 out of the valley bottom to eliminate flooding issues associated with beavers.
Walker Creek – Replace two stream crossings on FSR 015 and improve road drainage. Develop alternate road routes on sections of this road that are adjacent and impacting Walker Creek.
Goodenough Creek and Mormon Canyon – Work with BLM to replace two fish passage culverts on FSR 541 and improve the ford crossing located in the campground.

- Restore the hydrologic function and riparian buffer on Mink Creek within the vicinity of the Bannock Guard Station. Remove bone-yard out of the AIZ and encourage the regeneration of the destroyed emergent wetland.
- Fix headcut and improve AOP on Walker Creek below Marsh Creek Road. Partner with the local Soil Conservation District (IASCD), NRCS, gas company, and the private landowners.
- Work cooperatively with private landowners to improve their cattle grazing programs to protect riparian areas. This could include offsite water sources and fencing to exclude cattle from the stream and surrounding riparian areas.
- Control motorized recreation as described in the Caribou NF Travel Plan. Obliterate user-created routes. Soils report contains several site-specific recommendations.
- Control dispersed camping. Soils report contains several site-specific recommendations.
- Improve road and trail maintenance

WILDLIFE

General Species Recommendations

- Greater sage-grouse: Sagebrush habitat extent and condition needs to be inventoried in the watershed before any treatments are recommended. Vegetation treatments in sage-grouse habitat should follow the guidelines recommended by Connelly et al. (2000). Unless the sagebrush survey/mapping recommended above suggests otherwise for certain areas, any wildfires in sagebrush should be controlled to minimize loss of sagebrush.
- Pygmy rabbits: Monitor appropriate habitats for pygmy rabbits, identify occupied areas and manage appropriately (RFP 5-4).
- Boreal, flammulated and great gray owls: Survey for boreal, flammulated and great gray owls during nesting season for these species to determine presence and population levels within the watershed.
- Wolverine: Conduct winter track survey in appropriate habitats for wolverine to determine presence within the watershed.
- Migratory birds: Establish two bird survey trend plots during the breeding season for long-term monitoring to collect data on avian use and populations within the area (RFP 5-4). One survey plot would likely be located at the Cherry Springs Nature Area and the other would be placed at another appropriate location within the watershed.
- Amphibians: Continue amphibian monitoring within watershed as conducted by Idaho State University (RFP 5-5).

Recreation/Transportation

- Continue and improve utilization of the Revised Travel Management Plan by Improving OHV signage, seeking appropriate ways to close routes identified by the plan that should be closed (as well as any new user-created trails), increase LEO/FPO patrols, especially during hunting season where the focus is on illegal motorized cross-country travel or illegal trail use.

Range Resources

- Work with IDF&G to refine the Mule Deer & Elk habitat layers to identify key seasonal concentration areas. Subsequently monitor range conditions within important areas and take appropriate management actions according to the Revised Forest Plan adaptive management learning loop (RFP 5-9).
- Assess vegetation condition on critical big game winter ranges and implement action where needed to improve low quality or declining winter range (RFP 5-7).

- Promote healthy sagebrush and mountain brush communities, including forb components and a diversity of age structure in shrub components, especially on important winter range through managed grazing, mechanical methods, and fire.

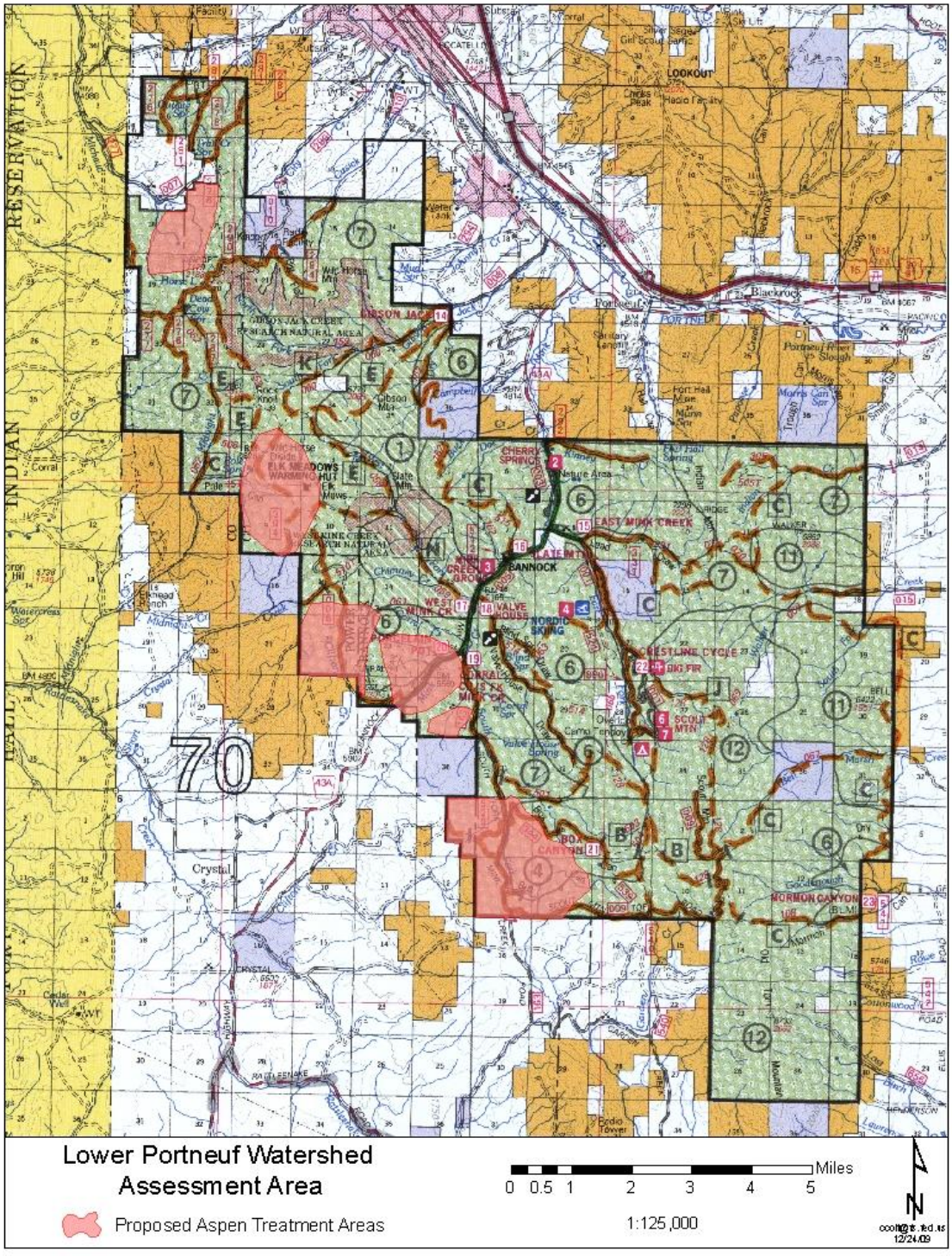
Beaver Ecology

- Develop a beaver plan for the watershed that prioritizes locations for beaver transplants on the Caribou National Forest and identifies areas of potential concern (RFP 5-4).
- Modify Box Canyon Road Culvert at South Fork Mink Creek to avoid conflicts with beaver activity.
- Seek ways to promote beaver activity on the landscape, while allowing agencies to control individual beaver where structures, campgrounds, roads, or other investments are threatened.
- Seek opportunities to utilize fire in aspen and riparian habitats in the upper portions of the sub-watersheds to move these areas to an earlier successional state. This will provide necessary forage for beaver in these portions of the drainages.

Fire Ecology & Loss of Aspen

- Map current and historical aspen vegetation types and current condition. Identify areas and total number of acres which are threatened by conifer encroachment.
- Seek opportunities to improve aspen stand health and increase aspen habitat acres. Seek areas where aspen are being encroached upon by conifers and treat to decrease conifers, increase aspen and diversify age structure (RFP 5-3). Map 1 identifies four areas where treatments are recommended to restore aspen communities.

Figure 22: Potential Aspen Treatment Areas



Wildlife Education

- Cherry Springs Nature Area – improve ecological interpretive signage on site. Enlist cooperators help in improving birding opportunities, information, access, and

participation. Bring more in line with State and National birding recognition for the area. Additionally, use this location to educate public on the need for, and benefit from fire on the land. This area needs to be identified with signs placed at the entrance to the nature area, at the north and south ends of the Mink Creek road and on the two Mink Creek exit signs on I-15.

Inventory/Monitoring:

- Work with IDF&G to refine the Mule Deer & Elk habitat layers to identify key seasonal concentration areas. Subsequently monitor range conditions within important areas and take appropriate management actions according to the Revised Forest Plan adaptive management learning loop (RFP 5-9).
- Monitor appropriate habitats for pygmy rabbits. Identify occupied areas and manage appropriately (RFP 5-4).
- Develop a beaver plan for the watershed that prioritizes locations for beaver transplants and identifies areas of concern (RFP 5-4).
- Map current and historical aspen vegetation types and identify areas and total number of acres which are threatened by conifer encroachment.
- Map sagebrush and mountain brush canopy cover classes across the area to use when designating treatments (RFP 5-3).
- Assess vegetation condition on critical big game winter ranges and implement action where needed to improve low quality or declining winter range (RFP 5-7).
- Establish two breeding bird trend plots for long-term monitoring to collect data on avian use and populations within the area (RFP 5-4). One survey plot would likely be located at the Cherry Springs Nature Area and the other would be placed at another appropriate location within the area.
- Survey potential amphibian habitat as per Regional Office recommendations (RFP 5-5).

Protection/Restoration

- Modify Box Canyon Road Culvert at South Fork Mink Creek to avoid conflicts with beaver activity (see Fisheries section).
- Continue the implementation of the Travel Management Plan. Improve OHV signage. Seek appropriate ways to close routes identified by the plan that should be closed, as well as any new user-created trails. Increase LEO/FPO patrols, especially during hunting season where the focus is on illegal motorized cross-country travel or illegal trail use.
- Seek ways to promote beaver activity on the landscape, while allowing agencies to control individual beaver where structures, campgrounds, roads, or other investments are threatened.

- Promote healthy sagebrush and mountain brush communities, including forb components and a diversity of age structure in shrub components, especially on important mule deer use area.
- Seek opportunities to improve aspen stand health and increase aspen habitat acres. Seek areas where aspen are being encroached upon by conifers and treat to decrease conifers, increase aspen and diversify age structure (RFP 5-3).
- Seek areas where vegetation treatments in sagebrush habitats where cover is >25% would be appropriate (RFP 5-3).

Other

Cherry Springs Nature Area: Improve ecological interpretive signage. Enlist cooperators help in improving birding opportunities, information, access, and participation. Bring more in line with State and National birding recognition for the area. Additionally, use this location to educate public on the need for, and benefit from, fire on the land.

RECREATION

Improved recreation signing and information within the analysis area will help Forest visitors comply with designated travel routes, weed free forage and tread lightly/leave no trace principles. Improved information on our webpage, way-finding signs, and route maps at all trailheads will improve the quality of all recreation opportunities in the watershed.

Developed and Dispersed Camping

Existing developed camping capacity within the analysis area will meet demand within the next five years. Maximize existing capacity by improving each camp unit's layout and parking.

Dispersed camping capacity should be maintained to meet current and future demand. The District can improve management of dispersed camping on Forest System lands by defining use areas with gravel and barriers to contain use and minimize soil compaction and vegetation loss. Consider adding fire rings to the most popular areas. Reduce dispersed use and associated travelways within riparian zones (AIZs) when possible. Install signs at dispersed camp areas to discourage off-route travel, dumping, vegetation trampling and cutting of live trees. Areas of concern include the "Pine Plantation" and roadside areas just south of the Pine Plantation within the South Fork of Mink Creek. Other dispersed camp areas of concern include pull-offs along Forest Road #002 (Lower Camp Taylor Road) and dispersed camp sites in the vicinity of Crestline Trailhead.

Transportation and Trails

Improve travel safety by reducing "mixed traffic" on high-use roads. The South Fork of Mink Creek road receives mixed-use by full-sized vehicles and ATVs. An alternative route to link area ATV trails within the South Fork is needed. A parallel or contiguous trail along the South Fork Road for ATVs, motorcycles and mountain bikes would reduce risks of mixing high speed and low speed traffic.

Improving road and trail drainage and location will reduce travel route impacts to soils and waterways. Pursue grant opportunities to accomplish road and trail reconstruction for areas of concern, including South Fork of Mink Creek Road, Box Canyon Road, Elk Meadows trail loop, Crestline trail, and Corral Creek trail. Install rock barriers to prohibit ATV travel on designated motorcycle trails.

Improve trail network connectivity to best utilize existing trail opportunities and disperse trail use from high use areas to lower use areas. Consider connecting the City Creek trail system with Gibson Jack Trail to disperse use from west foothills into Mink Creek Recreation Area. This action may require the expansion of the Gibson Jack Trailhead.

ATV opportunity can be improved by connecting the Walker Creek to Goodenough Canyon trail with the Mink Creek trail system. Two designated motorized trails (Trail # 103 and #106) within Walker Creek are dead-end trails due to the loss of access through private lands. Consider converting these trails to non-motorized use. Changes to the Westside District Motor Vehicle Use Map will require further analysis through the NEPA process and will have full public involvement.

Winter Recreation

Way-finding signs, trail maps at trailheads, and on-the-ground trail signs at all winter trailheads will improve the quality of winter recreation within the analysis area.

Hunting, Fishing and Gathering Forest Products

Improved trailhead information will help area hunters comply with travel regulations. Fishing opportunities could be improved with the development of beaver pond networks, culvert upgrades and bridge replacements at Cherry Springs Nature Area.

Due to the shortage of firewood within the analysis area, firewood permits could go to designated cutting areas in other areas of the District or no firewood permits offered on the District. The "Pine Plantation" should be signed as a "no cutting of firewood" zone to reduce cutting of live trees, to protect heritage resources and retain a natural setting.

Consider designated Christmas tree cutting areas outside the analysis area to control fuels, thin stands, and provide a local recreation opportunity. The existing District policy of not issuing special use permits for gathering boughs, cones, rocks and other forest products should continue to protect forest resources from over-harvest.

CULTURAL RESOURCES

Continue educating Forest Staff and Forest users regarding rights reserved for members of the Shoshone-Bannock Tribes within the analysis area. Continue to consultation and coordination efforts with the Shoshone-Bannock Tribes. Investigate and pursue partnership opportunities which protect and enhance resources within the analysis area.

It is recommended that a comprehensive survey strategy be implemented to adequately identify and document significant archaeological and historic properties in the analysis area.

Increase the incorporation of Heritage Resource information in land management decisions.

Cultural resources are non-renewable resources. As such, Federal regulations have been passed which require mitigation in the event of adverse affect to significant cultural sites and obligate Federal agencies including the Forest Service and to protect and manage significant cultural resource properties. The Antiquities Act of 1906, the Historic Sites Act of 1935, the NHPA of 1966 with its 1992 and 2002 Amendments, the Archaeological and Historic Preservation Act of 1974, the ARPA of 1979, and the NAGPRA of 1990 exemplify the long and progressive history of regulations concerning the protection of significant archaeological resources.

One of the goals of land managers is to protect and preserve cultural resources within an agency's jurisdiction. In order to fulfill this responsibility, an inventory of these resources is essential. Once site locations are identified, this information can then be provided to planners so that management decisions can be made to avoid or mitigate the effects of proposed project activities. In an effort to identify significant historic and/or archaeological site locations resource specialists should utilize survey methods including pedestrian transects and visual assessments of the projected area of potential effects (APE) for all site specific undertakings.

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